SmartGraphics
PRINTRONIX IGP Emulation
Programmer's Manual
GEK-89149A

PREFACE

Introduction

This manual provides detailed instructions on how to use the SmartGraphics Processor to emulate the functionality of the Printronix-100 Intelligent Graphics Processor (IGP). All references in this manual regarding SmartGraphics refer to the SmartGraphics Processor operating under this IGP emulation.

SmartGraphics provides enhanced text and graphics features that include variable-sized and rotated characters, forms and label generation, as well as variable bar codes. Instructions for utilizing these SmartGraphics features are presented according to mode of operation and applicable commands. The following information is presented as each function or command is covered:

- Mode of Operation
- Command syntax
- Explanation and usage
- Illustrative examples

This manual also includes appendices containing command summaries, conversion tables, error codes and recovery, and configuration instructions.

Objectives of This Manual

The purpose of this manual is to familiarize you with the capabilities and features of the SmartGraphics Processor. It is designed to teach you how to use the required SmartGraphics commands. Each command is presented in an easy-to-learn format and illustrated through one or more representative examples.

Intended Audience

The information provided in this manual will enable the user to take advantage of the desired print features and functions. Likewise, software developers will find complete technical specifications necessary to fully utilize SmartGraphics capabilities.

Prerequisite

Though not required, a prior knowledge of programming logic is naturally advantageous. As an aid to the novice user, an introduction to printer software is provided in Chapter 1.

Manual Organization

This manual provides complete instructions for programming the SmartGraphics Processor. Information is presented as you will need it, starting with the basics. Each operation is illustrated by one or more examples to help you understand the required command entries and printer functions.

The following is a brief summary of each chapter:

Preface. The preface introduces SmartGraphics and explains the purpose of the manual. It also describes the standard conventions that will be used and a brief overview of each chapter.

Chapter 1 - General Description. This chapter highlights SmartGraphics features, modes of operation and methods of printing. A brief introduction to printer software is also provided for the novice user.

Chapter 2 - Normal Mode Commands. This chapter presents the commands that are available under the Normal Mode of operation. Commands are listed alphabetically according to function for easy reference.

Chapter 3 - Forms Generation. This chapter includes the commands used to create forms and logos, as well as forms printing. Methods of incrementing and decrementing data will also be explained. Commands are grouped according to mode and function.

Chapter 4 - Bar Codes. This chapter describes the various bar codes available under SmartGraphics. Specific instructions for generating those bar codes are supported by illustrative examples.

Chapter 5 - Character Sets and Fonts. This chapter explains how to use command parameters to select the desired size or font for text printing. Instructions are also provided for creating user-defined character sets.

Appendix A - Command Summary. This appendix lists all the commands available under the SmartGraphics IGP emulation.

Appendix B - Character Sets. This appendix provides samples of multinational character sets.

Appendix C - Error Codes. This appendix defines the coded error messages that can result from improper SmartGraphics command usage.

Appendix D - Description of Options Settings. This appendix describes the various options conditions used to set or change the SmartGraphics default settings.

Conventions Used in This Manual

Throughout this manual, the following visual cues and standard text formats will assist you in identifying various elements:

Bold	-	Used to set off headings and important information.
Italics	-	Used for manual names and command titles.
Bullets	-	Bullets (**!**) itemize information in each section.
ALL CAPS	-	ALL CAPS call your attention to important words.

Getting Started

To use the SmartGraphics IGP Printronix emulation, you must enter the **PRG:SmartGraphics** menu and select the **SGL:IGP Emul** option. For detailed instructions on selecting the SmartGraphics option, see the User's Manual for the model printer in use.

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CHAPTER 1. GENERAL DESCRIPTION

Introduction

This chapter gives a brief overview of SmartGraphics features and command conventions. The following information is included:

- Features
- Entering commands
- Modes of Operation

How to Turn On IGP Emulation

To turn ENABLE the IGP emulation, use the printer control panel to enter the LCD menu tree, find the SmartGraphics or SGL menu, and then select IGP. See the user's manual for the printer in use for more information.

Printer Emulation

Some printers have the ability to emulate (function similar to) a printer made by a different manufacturer. The SmartGraphics Processor can emulate a Printronix printer with the IGP-100 option installed.

Under the IGP emulation, SmartGraphics supports a powerful command set that consists primarily of English text.

Any of the SmartGraphics print samples presented in this manual can be duplicated by creating an ASCII text file that contains the command lines shown in the example. To illustrate, use an editor of your choice, to create a file with two lines:

```
~DENSITY;17
This is 17 cpi
```

NOTE: There must be no blank spaces in front of a command. Lines of code can not be indented when programming in this language.

Save the file under the file name TEST, then copy the file to the printer with the DOS command:

```
copy test prn
```

IGP with Other Emulations

For every printer, there is a set of control codes and escape sequences that control features of the printer such as margins, tabs, form length, pitch, boldface, underline, graphics, and so forth. Such a control set originates with a printer manufacturer. If a particular printer model has been widely used, its control set may survive the obsolescence of the printer. If you have drivers for, say, a ProPrinter, then you might prefer that any printer in your office/company would function as (emluate) a ProPrinter. For that reason, printer manufacturers provide emulations of the control sets of other manufacturers' printers. Existing drivers may remain in service through several printer changes, and certain emulations become de-facto standard printer control languages.

The SmartGraphics option is a printed circuit board with a processor, firmware, and other components neccessary to implement two industrial graphics emulations: IGP and QMS.

Whether or not the SmartGraphics option is installed or enabled, the native control set for this printer is ANSI X3.64. Alternative control sets (emulations) can be selected from the emulation menu on the control panel, or in some cases, from the host. Before IGP is ENABLED, the printer is in some emulation. Let's call that emulation the pre-graphics emulation.

When IGP is ENABLED, the printer continues to interpret control codes and escape sequences according to the pre-graphics emulation until it receives a bona-fide IGP control sequence. It processes that and all subsequent input as IGP until a bona-fide IGP terminating command or condition is received, for example, ~NORMAL. Then, it reverts to the pre-graphics emulation. Any pre-graphics emulation parameters, such as font, pitch, print quality, form length, and so forth that were selected before IGP data was received are re-asserted when IGP terminates.

For example, assume the selected (pre-graphics) emulation is Proprinter, and you want to mix IGP jobs with Proprinter jobs. You don't have to turn off IGP to use Proprinter except in the situation where your Proprinter data includes IGP commands.

On the other hand, if a ASCII dump of an IGP job is desired, turn off the SmartGraphics (or SGL) option and the IGP code will print as plain text.

Features

The SmartGraphics Processor provides a variety of enhanced graphics and printing capabilities. The following is a brief overview of these features.

Variable Print Size

Alphanumeric height and width can be independently controlled over a range of sizes up to 9.9 inches (vertically and horizontally). Compressed print sizes available are 13, 15, and 17 characters per inch (cpi). At 17 cpi, you can print up to 136 characters in an 8-inch printed area.

Reversed Print

Printing white characters on a dark background (reversed print) allows you to achieve highlighting and contrasting effects.

Alphanumeric Rotation

To permit enhanced forms design and creativity, characters (normal, expanded, and compressed) can be rotated 90, 180, and 270 degrees.

Logo Creation

Logos can be created and added to forms and listings by using alphanumeric commands and a variety of print and shading features.

Forms and Label Generation

Form and label designs can be created and then duplicated horizontally and vertically to give a “preprinted” appearance. Graphic features include boxes, vertical and horizontal solid and dashed lines (with variable thickness), logos, and special alphanumeric print methods: fixed, overlay and dynamic data.

Fixed, Dynamic, and Overlay Data Printing

Alphanumeric data can be printed on forms in three ways: “fixed” data, entered when the form is created (e.g., company name and address); “dynamic” data that is entered by command when the form is executed (e.g., quantity and amount).; “overlay” data, printed in a specified location when the form is executed to provide a “filled-in” look (e.g., customer name and address)

Automatic Data Increment/Decrement

Data fields (alphanumeric and bar code) can be automatically incremented or decremented. The user can specify both the beginning value and increment/decrement value.

Bar Codes

Bar code styles can be printed in a regular or dark mode using standard or user-selected ratios. The following bar code styles are available: Code 3 of 9, Interleaved 2 of 5, UPC-A, UPC-E, MSI A through D, Code 128 Subset B and C, EAN 8, EAN 13, and POSTNET.

Scaling Function

Graphic elements (e.g., boxes, corners, etc.) can be scaled so that they retain their physical characteristics when printed in horizontal or vertical densities other than the base density of 60 x 72 dots per inch.

Multinational Character Sets

SmartGraphics provides the user with many foreign character sets (96 characters in length). You can also create your own character sets using characters already defined in the font memory.

Modes of Operation

SmartGraphics supports four modes of operation: Normal, Create Form, Create Logo, and Execute Form. You select the mode of operation and the task to be performed by sending a sequence of commands to the printer. Each mode has specific commands which are valid in that mode.

Normal Mode

In Normal Mode, the printer monitors the data stream until a Special Function Control Character (SFCC) is detected.Until a SFCC is received, no IGP processing takes place. A SFCC identifies the start of a command to enable a SmartGraphics function. The SFCC default is a tilde “~”; however, this can be changed to a different character in the printer’s menu.

Create Logo Mode

The Create Logo Mode is used to design a logo to be printed on any document (i.e., form, report, or listing). The logo is created, not printed, under the Create Logo Mode, it is printed during the Execute Form Mode when the document is printed. Only logo-related error messages will be printed during the Create Logo Mode.

Create Form Mode

The Create Form Mode allows design of forms, form elements, and bar codes. Graphics including lines, boxes, corners, bar codes, data, and previously defined logos can be defined as part of a specific form by using the appropriate commands. The form is not printed under the Create Form Mode; it is printed during the Execute Form Mode. Only applicable error messages will be printed during the Create Form Mode.

Execute Form Mode

Documents are printed under the Execute Form Mode. Various print features are available (e.g., compressed print, elongated characters, etc.). The alternate character set can also be used.

Stored Data

Data stored in the printer’s memory remains there until it is deleted by a command, power is removed, or the reset command is received.

Command Syntax Rules

SmartGraphics commands have a specific format that must be followed for proper operation. Failure to comply to the required syntax will result in indeterminate operation. The following subsections specify the syntax rules used for commands. Examples are provided to illustrate each rule.

Throughout this manual, commands are presented as follows:

Compressed Print (Density) Command Syntax:

<SFCC>DENSITY;n<LF>

Parameters in Command Syntax:

<SFCC>	Special Function Control Character. Unless changed by in the printer's menu, TILDE (~) is the default SFCC.
DENSITY	Character Density Command
n	Selects the density in cpi. Replace "n" with 10,12,13,15,17, 10A or 10B.
<LF> (or <CR><LF>)	Terminator

The following applicable syntax examples are based on the above DENSITY command. A ✓ mark indicates the correct syntax usage; the X indicates incorrect usage of the applicable command character or parameter.

Special Function Control Character <SFCC>

The Special Function Control Character (SFCC) identifies beginning of an IGP command. Various characters can be selected as the SFCC (the tilde "~" character is used as a default and will be used in all examples). The SFCC must be placed at the beginning of a line.

Example: Set compressed print (17 cpi)
(✓) ~DENSITY;17
(X) DENSITY;17

Semicolon (;)

A semicolon must be used to separate each parameter (alpha data, numeric data, options, etc.) of the command. No blank spaces are allowed between the semicolon and the next parameter. A missing or misplaced semicolon will result in an error message.

Example:
(✓) ~DENSITY;17
(X) ~DENSITY 17

Numeric Value (n)

Throughout this manual, a lowercase n is used to represent a numeric value in the command stream. If a command includes this n parameter, you must substitute the appropriate numeric value in place of the n. No value is required if the lowercase n is part of an optional, unused command parameter.

Example:
(✓) ~DENSITY;17
(X) ~DENSITY

Uppercase

ALL commands and form names must be entered in uppercase.

Example:
(✓) ~DENSITY;17
(X) ~Density;17

Terminator

For the printer to accept the command line, it MUST be followed by a LINEFEED or a carriage return with line feed terminator. A command line without a terminator will not be accepted.

Example:
(✓) ~DENSITY;17
(X) ~DENSITY;17;

Printable Character

Alphanumeric and bar code data must be bordered by a printable character (a delimiter). Double quotes (“) will be used as the delimiter throughout this manual. Any printable character other than a space, slash (/), or the SFCC can be used as the delimiter. The same printable character must occur before the first character and after the last character of the text; it cannot occur within the text.

Example:
(✓) Print 17 cpi sample
(X) Print 17 ”cpi” sample

(Delimiter cannot be used within the text.)

(X) dog biscuits taste good

(Printed result: *og biscuits taste goo*. The lowercase d positioned at the beginning and end of the text is interpreted as the delimiter.)

Parentheses ( )

Parentheses denote variable data. You have a choice of what to enter, but you MUST enter something at this point in the command line. Do not enter the parentheses themselves.

Example:
(✓) DPrint 17 cpi sampleD
(✓) Print 17 cpi sample
(X) (D)Print 17 cpi sample(D)

Brackets [ ]

An optional command parameter is shown inside brackets. To use the option, include the data within the brackets, but do not enter the brackets themselves.

Example:
(✓) ~SCALE;CHAR;8;13
(X) ~SCALE;CHAR[;8;13]

Other Command Considerations

Form Name

Up to eight (8) alphanumeric characters (no spaces) can be used to identify the form being created. The form name is used to identify the form during Execute Form Mode.

Example:
(✓) ~CREATE;FORM001
(X) CREATE;FORM 001

Comments

Comments can be added to a command line or on a separate line to aid in preparation or maintenance of a form or logo. Comments must be preceded by a “/” slash command.

Example:
(✓) ~CREATE;FORM001 /FORM #1
(X) CREATE;FORM 001 FORM #1

CHAPTER 2. NORMAL MODE COMMANDS

Introduction

All commands covered in this section are valid in the Normal Mode of operation. Commands are listed alphabetically according to function for easy reference.

The following Normal Mode commands are covered in this chapter:

• Compressed Print	DENSITY
• Create Form Mode	CREATE
• Delete Form	DELETE FORM
• Delete Logo	DELETE LOGO
• Directory	DIRECTORY
• Execute Form Mode	EXECUTE
• Expanded Print	EXPAND
• Listen	LISTEN
• Multinational Character Set	ISET / USET
• Normal Mode	NORMAL
• Quiet	QUIET
• Reset	RESET
• Scaling	SCALE
• Vertical Line Spacing	LPI

Remember, each command must be entered in uppercase and followed immediately by a line feed or a carriage return with line feed terminator.

Compressed Print Command : DENSITY

The Compressed Print command sets the printing density in characters per inch (cpi). An n parameter of 10A selects OCR-A at 10 cpi; 10B selects OCR-B at 10 cpi.

A Density command sets the print size for all subsequent alphanumerics until another Density command, a Normal command, or a Reset command is entered. The default print density is 10 cpi.

DENSITY Command Syntax:

<SFCC>DENSITY;n<LF>

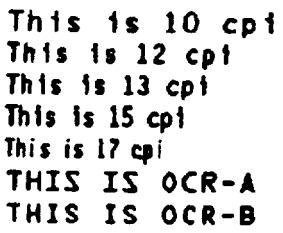
DENSITY Parameters:

<SFCC>	Special Function Control Character. The default is TILDE (~).
DENSITY	Character Density Command
n	Selects the density in cpi. Replace "**n**" with 10,12,13,15,17, 10A or 10B.
<LF>	Terminator

DENSITY Programming Example (Print Sample Fonts [10 CPI to OCR-B]):

```
~DENSITY;10
This is 10 cpi
~DENSITY;12
This is 12 cpi
~DENSITY;13
This is 13 cpi
~DENSITY;15
This is 15 cpi
~DENSITY;17
This is 17 cpi
~DENSITY;10A
THIS IS OCR-A
~DENSITY;10B
THIS IS OCR-B
```

Print Sample



Create Form Mode Command : CREATE

This command puts IGP in the Create Form Mode. In this mode, applicable commands are used to design form elements.

(Refer to Chapter 3 for command syntax and example.)

Delete Form Command : DELETE FORM

The Delete Form command is used to delete a form (identified by form name) from the directory and printer memory. If the SmartGraphics DELETE LOGOS option is ENABLED, then any logos associated with this form will also be deleted.

(See Smartgraphics options description in Appendix D.)

DELETE FORM Command Syntax:

<SPCC>DELETE FORM;FORMNAME<LF>

DELETE FORM Parameters:

<SFCC>	Special Function Control Character.
DELETE	Delete Form Command
FORMNAME	Name of form to delete. The entire form directory can be deleted by entering *ALL as the FORMNAME.
<LF>	Terminator

DELETE FORM Programming Example (Delete a form named LABEL) :

~DELETE FORM;LABEL

Delete Logo Command : DELETE LOGO

The Delete Logo command deletes the logo from the directory and printer memory. Once a logo is deleted, any attempt to print a form containing that logo will produce an error message.

DELETE LOGO Command Syntax:

<SFCC>DELETE LOGO;LOGONAME<LF>

DELETE LOGO Parameters:

<SFCC>	Special Function Control Character.
DELETE	Delete LOGO Command
LOGONAME	Name of Logo to be deleted. Enter the name exactly as it was created. The entire logo directory can be deleted by entering *ALL as the LOGONAME.
<LF>	Terminator

DELETE LOGO Programming Example (Delete a logo named NUT):

~DELETE LOGO;NUT

Directory Command : DIRECTORY

Use this command to print the following information:

- All memory resident forms and logos
- Logo assignments to forms
- Memory (printer) Memory usage and free space available

Up to 32 forms and 16 logos may be stored in printer memory provided total storage does not exceed available printer memory. The form will not print if memory is full. Free memory area must be equal to or greater than the size of the form being executed.

DIRECTORY Command Syntax:

<SFCC>DIRECTORY<LF>

DIRECTORY Parameters:

<SFCC> Special Function Control Character.

DIRECTORY Directory Command

<LF> Terminator

DIRECTORY Programming Example (Display printer memory directory listing):

~DIRECTORY

Print Sample

```
---------- DIRECTORY LIST ---------
FORM NAME                  SIZE(bytes)
  1NUT                        58
  LABEL2                     551
  NUTZ                        69
  BC_C39                     147
  BC_128B                    147
  BC_128C                    142
  BC_EAN8                    136
  BC_EAN13                   148
  BC_I25                     138
  BC_UPCA                    146
  BC_UPCE                    146
  BC_MSI                     136
  BC_POST                     74

LOGO NAME                  SIZE(bytes)

  NUT                        906

  TOTALS                    2944

Available memory = 29778
```

Execute Form Mode Command : EXECUTE

The Execute Form Mode command executes a previously created form.

Refer to Chapter 3 for command syntax and example.

Expanded Print Command : EXPAND

Use the Expanded Print command to enlarge alphanumeric characters vertically (character height) and horizontally (character width) up to 99 times the standard size. Both the VE and HE parameters must be zero or greater. A VE or HE setting of 1 gives single size characters using the expanded font; a setting of 0 results in standard size characters.

All alphanumerics following an Expanded Print command will be printed at the specified VE and HE values until the occurrence of another Expanded Print command, a Normal Mode command, or a Reset command.

EXPAND Command Syntax:

<SFCC>EXPAND;VE;HE<LF>

EXPAND Parameters:

<SFCC>	Special Function Control Character.
EXPAND	Expanded Print Command
VE	Indicates the vertical expansion factor. Range = 0 to 113.
HE	Indicates the horizontal expansion factor. Range = 0 to 113.
<LF>	Terminator

Example: .

EXPAND Programming Example (Print characters at the standard size, then set vertical and horizontal expansion at twice the standard size and print):

```
~NORMAL          /Normal Mode (no expansion)
ABC123
~EXPAND;2;2      /Expand characters 2x2
ABC123
~NORMAL          /return to Normal Mode
```

Print Sample

ABC123

ABC123

Listen Command : LISTEN

The Listen command returns the printer from the QUIET state to the standard operation state (see QUIET command). In standard mode of operation, valid IGP commands are executed by the SmartGraphics processor.

LISTEN Command Syntax:

<SFCC>LISTEN<LF>

LISTEN Parameters:

<SFCC>	Special Function Control Character.
LISTEN	Listen Command
<LF>	Terminator

Example: .

Programming Example (Enable standard operation):

~LISTEN

Multinational Character Set Commands : ISET / USET

The ISET (International Character Set) and USET (User-Defined Character Set) commands provide access to multinational and custom character sets.

(Refer to Chapter 5, Multinational Character Sets.)

Normal Mode Command : NORMAL

SmartGraphics is automatically set for Normal Mode when power is applied, or after a reset is issued to the SmartGraphics controller (this occurs following any change from the SmartGraphics menu). Use the Normal Mode command to return the printer to the Normal Mode of operation after performing a function under one of the other three mode commands (EXECUTE, CREATE or LOGO). In Normal Mode, the printer does not process (change) the data stream, but looks for the SFCC valid IGP commands.

Note: A Normal command following an Execute command must be preceded by an blank line (<LF>).

NORMAL Command Syntax:

<SFCC>NORMAL<LF>

NORMAL Programming Example (Return the printer to the Normal Mode):

~NORMAL

Quiet Command : QUIET

Use the QUIET command to put the printer in the Quiet state. In Quiet state, all data, including valid IGP commands, are passed to the printer and not executed by the SmartGraphics processor. The printer will remain in the Quiet state until the next occurrence of a LISTEN command that enables standard printer operation.

The following commands are valid in the Quiet state:

Listen	LISTEN
Select Format On	SFON
Select Format Off	SFOFF
Ignore Sequence On	IGON
Ignore Sequence Off	IGOFF

Note: The printer will ignore the QUIET command in Execute Form Mode.

QUIET Command Syntax:

<SFCC>QUIET<LF>

QUIET Parameters:

<SFCC>	Special Function Control Character.
QUIET	Quiet Command
<**LF>**	Terminator

Example: To print a listing of a file that contains SmartGraphics commands. Send a QUIET command prior to sending the file to the printer.

QUIET Programming Example:

~NORMAL	set to Normal Mode
~QUIET	tell SmartGraphics to NOT process IGP commands.
• • •	print the program listing
~LISTEN	return printer to standard operation

Reset Command : RESET

The RESET command deletes all forms and logos from printer memory. A reset can also be accomplished by cycling power (turning the printer off and on) or by changing a SmartGraphics parameter from the control panel menu.

RESET Command Syntax:

<SFCC>RESET<LF>

RESET Parameters:

<SFCC>	Special Function Control Character.
RESET	Reset Command
<LF>	Terminator

RESET Programming Example (Reset the printer):

~RESET

Scaling Command : SCALE

The Scaling command sets the vertical and horizontal pitch for form printing.

Refer to Chapter 3 for command syntax and example.

Vertical Line Spacing Command : LPI

Use the Vertical Line Spacing Command to select the vertical printing format. Default line spacing is 6 lpi (lines per inch). All subsequent text after an LPI will be printed at the new LPI until the occurrence of another LPI command, a Normal Mode Command, or a Reset Command.

LPI Command Syntax:

<SFCC>LPI;n<LF>

LPI Parameters:

<SFCC>	Special Function Control Character.
LPI	Vertical Line Spacing Command
n	Sets line spacing in lpi:6,8,9, or 10.
<LF>	Terminator

LPI Programming Example (Set SmartGraphics vertical line spacing to 8 lpi):

~LPI;8

Note: The LPI command affects only printed alphanumerics; the printer line spacing is not changed. Therefore, if the printer receives an 8 lpi command while SmartGraphics is set to 9 or 10 lpi, the top of the first character line may be cut off. This truncation can be avoided by issuing two line feeds before the 8 lpi data stream. You could also set the SmartGraphics option CR=LF, and then send a carriage return and line feed prior to the 8 lpi data stream.

CHAPTER 3. FORMS AND LOGO GENERATION

This section includes the commands used to create forms and logos, as well as forms printing. Methods of incrementing and decrementing data will also be explained. Commands are grouped according to mode and function.

The following commands and functions are explained in detail. Illustrative examples are provided where applicable.

Create Form Mode Commands

Create Command	CREATE
Alphanumerics	ALPHA
Boxes	BOX
Corners	CORNER
End Command	END
Form Length	LFORM6 / LFORM8
Horizontal Duplication	HDUP
Horizontal Lines	HORZ
Logo Call	LOGO
Page Number	PAGE
Reverse Print	REVERSE
Scale	SCALE
Scale and CP.DP Format	CP.DP
Vertical Duplication	VDUP
Vertical Lines	VERT
Create Logo Mode	LOGO
Execute Form Mode	EXECUTE

Create Form Mode Commands

The Create Form Mode commands are used to design forms, all form components (boxes, corners, etc.), and bar codes. Forms are not printed in the Create Form Mode, they are printed in the Execute Form Mode after all form design is complete. Each form element has its own specific set of commands and parameters that determine size, location, and content.

Create Command : CREATE

To begin form design, the Create Form Mode must be accessed using the Create command.

CREATE Command Syntax:

<SFCC>CREATE;[/]FORMNAME[;FL]<LF>

CREATE Parameters:

<SFCC> Special Function Control Character.

CREATE Create Form Mode Command

/ An optional debug parameter that checks each line in the program for invalid characters and parameters. The program is evaluated when you attempt to print the form under the Execute Mode. It is then that the form is actually stored in printer memory and the form name entered into the directory. Error messages will be printed for any errors found. The correct program equations will be stored. Ultimately, you must correct all errors and delete the /. The form will not be produced if the / is left in the program.

Note: The / may exist outside the parameter string; e.g., to precede a comment line."

FORMNAME Defines the name of the form being created. The form name may contain a maximum of eight alphanumeric characters. No spaces, semicolons, slashes, or the SFCC are allowed. An existing form with the same name will be overwritten and replaced. Any future editing, executing, or deleting of the form must be done using the assigned name.

FL Form Length. Use this optional parameter to designate the maximum length of the form in dot rows (6 lpi line spacing yields 12 dot rows per line; 8 lpi line spacing yields 9 dot rows per line). The default length of 792 dot rows (11 inches at 6 lpi) will be used if this parameter is left blank. You can enter a value (1 to 65,535) to specify Form Length in dot rows. You can also enter 0 to denote an unspecified length. If 0 is used, the form will end automatically after the last element has been printed.

CREATE Programming Example:
(Create a form named SAMPLE with an automatic form length)

```
~CREATE;SAMPLE;0        /create sample form
ALPHA
C17;20;15;0;0;"EEEE"    /17 cpi spacing
...                     ...
...                     ...
STOP                    /terminate Alpha command
END                     /terminate Create Mode
```

Note: A complete program and resulting output is shown under Alpha command example.

Alphanumerics Command : ALPHA

The standard Alpha command is used to define and position a data field on a form. Other forms of the Alpha command are used to automatically increment, decrement, duplicate, and reset alphanumeric data field values (see Incrementing Alphanumeric Data).

Depending on the parameters used, a printed alphanumeric data field will be treated as either static (preprinted) or dynamic data. Dynamic data is entered when the form is printed. The Position data position of a dynamic data field is set under the Create Form Mode; the entered alphanumeric data must be redefined before each print when the form is produced under the Execute Form Mode.

In addition to alphanumeric data string entry, Alpha command parameters provide the following data field manipulation options:

- 90° degrees clockwise and counterclockwise rotation
- 180° degrees rotation (inverted print)
- Reverse print (white on black) with two density options
- Elongated character printing (non-rotated printing only)
- Compressed print settings (non-rotated printing only)
- Dynamic data field positioning
- Vertical and horizontal character expansion

ALPHA Command Syntax:

ALPHA<LF>
[R[D][L];][E;][Cn;][AFn;L;][DIR;[UC;]]SR;SC;VE;HE;
(D)ASCII Text(D)<LF>
STOP<LF>

ALPHA Parameters:

ALPHA Alphanumeric Command

R[D][L] Reverse, Dense and Long Field: R and RD are optional reverse print parameters. An R specifies a black background; RD specifies a denser black background. The L (Long field parameter) option is used only when defining a dynamic data field (for either horizontal or rotated print). The L specifies a long background field to include descended characters, such as lowercase j, g, y, and p, parts of which print below the base line.

Note: The L option is not required for a static data field; the reverse field length will be adjusted automatically to include descenders.

E Elongation: The optional E parameter specifies elongated character printing (approximately double height and single width). If the E option is used, the VE and HE parameters must be set to 0 to avoid an error. The E option is not allowed with rotated alphanumerics.

Cn Compressed Print: Optional horizontal compressed print parameter. If used, C must be followed by an n value of 10, 12, 13, 15, or 17 to specify cpi (characters per inch), or 10A for 10 cpi OCR-A or 10B for 10 cpi OCR-B. If the Cn option is used, the VE and HE parameters must be set to 0 to avoid an error. The Cn option is not allowed with rotated alphanumerics.

ALPHA Parameters (Continued):

AFn;L

Form Location and Length: An optional parameter used to identify form location and length of a dynamic data field. If used, the actual text cannot be entered during the Create Form Mode (Do not use the ALPHA TEXT parameter). Dynamic text is entered during the Execute Form Mode, so it can be changed without redefining or recreating the form, refer to Execute Dynamic Alphanumeric Data.

To use the AFn;L option, replace n with a number (1 to 127) to specify the alphanumeric string location on the form. The SR and SC parameters specify the precise position (starting row and column) for field n. For L (length), enter the maximum number of characters (1-226) allowed for this alphanumeric string. The number of characters of dynamically entered text must be equal to or less than the assigned L value. Refer to Execute Dynamic Alphanumeric Data.

DIR;[UC]

Direction: Optional parameter for rotating a character string. No entry is required for standard horizontal print orientation. The UC (Upper Case only) parameter can be used to print rotated uppercase characters on the full page width. DIR is actually replaced with directional codes as follows:

CW = 90° clockwise rotation
CCW = 90° counterclockwise rotation
INV = 180° rotation (for inverted print)

The CW, CCW or INV can be followed by UC, if you wish to specify uppercase characters only. The UC option will convert all lowercase alpha characters to uppercase.

Note: The E (Elongated) and Cn (Compressed Print) options are not allowed with rotated characters.

SR

Starting Row: The SR value specifies the Starting Row position of the alphanumeric data (either static or dynamic). Replace SR with a numeric value (1 to one less than the length of the form). Character row or dot row is determined by the Scale command or the CP.DP format.

SC

Starting Column: The SC value specifies the Starting Column position of the alphanumeric data (either static or dynamic). Replace SC with a numeric value (1 to one less than the width of the form). Character column or dot column is determined by the Scale command or the CP.DP format.

VE

Vertical Expansion: The VE value is a factor for vertical enlargement of characters. Enter a numeric value (0 to 113). Zero specifies the standard font (no expansion). Both VE and HE factors must be zero or non-zero; characters cannot be enlarged in one plane only. VE and HE can contain different non-zero factors.

Note: The E (Elongated) and Cn (Compressed Print) parameters cannot be used with a non-zero vertical expansion.

ALPHA Parameters (Continued):

HE — Horizontal Expansion: The HE value is a factor for horizontal enlargement of characters. Enter a numeric value (0 to 113). Zero specifies the standard font (no expansion). Both VE and HE factors must be zero or non-zero; characters cannot be enlarged in one plane only. VE and HE can contain different non-zero factors.

D — Delimiter: Used to denote the start and finish of the alphanumeric string (ASCII TEXT). Use any printable character other than a /, the SFCC, or a character used within the string itself. Quotation marks (“) are most commonly used to denote both ends of an alphanumeric string. The delimiter is not printed.

ASCII TEXT — The alphanumeric to be printed. Enter any of the standard ASCII printable characters except the character used as the delimiter or D parameter. This static, or fixed data, appears prepositioned on the form at the position by the SR and SC parameters. Unlike dynamic data, this data can be changed only by redefining the form with the Alpha command under the Create Form Mode.

STOP — Stop terminates this command and causes the printer to wait for a new command. If STOP is not entered, the printer will wait for another set of Alpha command parameters.

Example: The following is an illustration of Alpha command capabilities showing various print sizes, rotation, and positioning of static data.

ALPHA Programming Example:

```
~CREATE;SAMPLE;0          /create sample form
ALPHA
C17;20;15;0;0;”EEEE”      /17 cpi spacing
C15;20;18;0;0;”EEEE”      /15 cpi spacing
C13;20;21;0;0;”EEEE”      /13 cpi spacing
20;24;1;2;”X”             /expand print x1 VE, x2 HE
20;26;2;1;”P”             /expand print x2 VE, x1 HE
20;27.5;3;2;”A”           /expand print x3 VE, x2 HE
20;30;3;3;”N”             /expand print x3 VE, x3 HE
20;33;4;3;”D”             /expand print x4 VE, x3 HE
R;23;28;0;0;”REVERSE”     /reverse
CCW;24;15;0;0;”Tilt”      /counterclockwise
CW;22;24;0;0;”Tip”        /clockwise
INV;26;20;0;0;”Flip”      /invert
STOP
END                       /terminate Create Mode
~EXECUTE;SAMPLE           /print sample

~NORMAL                   /return to Normal Mode
```

Print Sample

Incrementing Alphanumeric (or Bar Code) Data : STEPMASK / STARTDATA

This feature is useful for automatic incrementing of data fields, such as item numbers on invoice forms, boxes or carton labels. This updating function is generally referred to as the incremental field feature. Whether the data is actually incremented or decremented depends on the sign (+/-) direction parameter.

The incremental field feature can be used with either fixed (static) or dynamic data. As with the Alpha (or bar code) command used in the Create Form Mode, additional Execute Form command parameters are required to use this feature with dynamically entered data (see Execute command). A maximum of 255 incremental static (fixed) alphanumeric fields per form (up to 65,535 forms) are allowed..

Before explaining Alpha command format, the STEPMASK and STARTDATA parameters that control incrementing need to be explained. These parameters can be part of both the Incremental Alphanumeric Fixed Data command and the Execute command when using Incremental Alphanumeric Dynamic Data.

Note: The equivalent bar code commands, Incremental Bar Code;increment/decrement Bar Code Fixed Data and Incremental Bar Code Dynamic Data, will be covered in Chapter 4. The incremental parameter functions are the same, but the bar code command syntax is quite different from the Alpha command. The following STEPMASK and STARTDATA explanation Alpha and bar code commands.

The STEPMASK STEPMASK parameter performs three functions:

1) specifies the increment value (step)
2) specifies the number of characters allowed in the data field (STARTDATA)
3) provides a mask to control incrementing of linked or unlinked parts (subfields) of the data field.

The STARTDATA parameter contains the starting value of the data field. The number of characters must be equal to or less than the number of characters in the STEPMASK parameter. Where the number of alphanumeric characters is less, the data will be right justified and preceded by spaces.

These characters are allowed in STARTDATA fields to be incremented:

Numerics, 0 - 9.
Alpha, A - Z (uppercase only).

Any printable character is allowed in non-incrementing fields.

Note: Bar code STARTDATA values are determined by the type of bar code being used. Refer to Chapter 4 for individual bar code specifications.

Example: A STEPMASK of 000001 will increment a 7-character STARTDATA value by one with each printing. In other words, a STARTDATA of “AB34560” will become AB34561, AB34562, etc.; AB3456A

will become AB3456B, AB3456C, etc.

Note: Complete Alpha command syntax is covered under Incrementing Alphanumeric Fixed (and Dynamic) Data Fields. The following examples illustrate the relationship between the STEPMASK and STARTDATA parameters (the default values are to be assumed for the repeat and reset parameters).

Although the STEPMASK and STARTDATA values are not entered in this command format, it is easier to illustrate and interpret their relationship as follows:

	Value	Description
STEPMASK	0000001	Single 7-alphanumeric field
STARTDATA	AB34560	
Results	AB34561	First printing
	AB34562	Second printing
	|	etc.
	AB99999	
	AC00000	
	AC00001	

The above example shows how STEPMASK characters control subsequent STARTDATA output. Certain characters have specific functions; these characters are numbers (0 through 9), a space, and the letter L. The following table is a summary of the rules for Alpha or bar code STEPMASK character function and STARTDATA output:

STEPMASK	STARTDATA	Effect on STARTDATA Contents
0-9	0-9	Increment number by corresponding STEPMASK amount.
0-9	A-Z	Increment alpha character by corresponding STEPMASK amount.
0-9	Space	Will become same character type (alpha or numeric) as character to right (linked increment position). Will be numeric if in least significant position.
0-9	Not 0-9 or A-Z	Results in error condition.
L	Anything	Linked, non-incrementing alphanumeric character.
Anything Else (e.g.,X)	Anything	Non-incrementing alphanumeric character.

Subfields within the STARTDATA field can be “linked” or “unlinked” depending on the existence of one or more L’s in STEPMASK. For example, consider the STARTDATA data field 123ABC001 as three separate subfields: 123/ABC/001. In order to cause 123ABC999 to become 124ABC000, the subfields on either side of the ABC subfield must be linked. Here is how you can do that using the L variable:

Example 1:

	Value	Description
STEPMASK	000LLL001	Two linked subfields
STARTDATA	123ABC900	
Results	123ABC901	First printing
	123ABC902	Second printing
	|	etc.
	123ABC999	
	124ABC000	

An Alpha or bar code STEPMASK containing two incrementing, unlinked subfields (using the same STARTDATA as above) will produce the following:

Example 2:

	Value	Description
STEPMASK	001XXX001	Two unlinked subfields
STARTDATA	123ABC900	
Results	124ABC901	First printing
	125ABC902	Second printing
	|	etc.
	222ABC999	
	223ABC000	

The following is an example of an Alpha STEPMASK containing two linked subfields with a leading space (represented by an underscore):

Example 3:

	Value	Description
STEPMASK	_L01	Two linked subfields
STARTDATA	_CAA	
Results	_CAB	First printing
	_CAC	Second printing
	|	etc.
	_CZZ	
	ACAA	

Note: Symbols rather than values would be shown for bar codes in examples 1 and 2. The leading space in example 3 is not relevant to bar coding.

Incremental Alphanumeric Fixed Data Fields Command : ALPHA

This Alpha command is a modified version of the standard Alpha command. Do not use it as a substitute for standard alphanumeric command; use it only to automatically increment fixed data alphanumeric fields. Refer to standard Alpha command instructions for parameters not covered below. Also, see Incrementing Alphanumeric Data for a detailed explanation of the STEPMASK and STARTDATA parameters.

Incremental Alphanumeric Fixed Data Fields Command Syntax:

ALPHA<LF>
[R[D];][E;][Cn;]**I**;[DIR;]SR;SC;VE;HE;**[idir]<LF>**
STEPMASK;[RPTnnn;][RSTnnn;](D)STARTDATA(D)<LF>
STOP<LF>

Incremental Alphanumeric Fixed Data Fields Parameters:

I — Increment: Identifies the Alpha command as the Incremental Alphanumeric Fixed Data Fields command.

idir — Increment Direction (default is to increment): An optional parameter used to specify the arithmetic effect of the step on the data field. Enter “+” (or leave blank) to increment (add step amount to) or enter “-” to decrement (subtract step amount from) the data field.

STEPMASK — Specifies the increment amount (step), data field length, and mask to control incrementing. Refer to Incrementing Alphanumeric Data for details.

STARTDATA — The starting value of alphanumeric data field to be incremented. The number of STARTDATA characters must be equal to or less than the number of characters in the STEPMASK parameter. STARTDATA text must be enclosed within the standard delimiters (commonly quote marks); e.g., “123ABC001”. Refer to the Incrementing Alphanumeric Data for details.

RPTnnn — Repeat Count (default is 1; i.e., increment with each printing): An optional parameter used to specify the number of times to repeat a field value before incrementing it. This feature is useful for printing multiple copies of a form (such as a label) before changing the data field. To use this option, enter RPT and replace nnn with the repeat count (1 to 65535).

RSTnnn — Reset Count (default is zero; no reset): An optional parameter used to specify the number of times to print an incremented field (on one or more forms) before resetting it to its starting value. This feature is useful if the data field consists of levels of subfields; e.g., job/phase/item number generation. The item number can be generated, reset, and then the phase incremented, etc. To use this option, enter RST and replace nnn with the reset count (1 to 65,535).

Example: Increment and decrement a STARTDATA value containing linked subfields, and increment a STARTDATA value containing two unlinked subfields.

Incremental Alphanumeric Fixed Data Fields Command Programming Example:

```
~CREATE;COUNT;1          /create a one-line form
ALPHA
I;1;10;0;0               /increment
000LLL001;"123ABC995"    /two linked subfields
I;1;25;0;0;-             /decrement
000LLL001;"123ABC001"    /two linked subfields
I;1;40;0;0               /increment
001XXX001;"ABC999ZZV"    /two unlinked subfields
STOP
END
~EXECUTE;COUNT;10        /print 10 times

~NORMAL
```

Print Sample

```
123ABC995      123ABC001      ABC999ZZU
123ABC996      123ABC000      ABD999ZZW
123ABC997      122ABC999      ABE999ZZX
123ABC998      122ABC998      ABF999ZZY
123ABC999      122ABC997      ABG999ZZZ
124ABC000      122ABC996      ABH999AAA
124ABC001      122ABC995      ABI999AAB
124ABC002      122ABC994      ABJ999AAC
124ABC003      122ABC993      ABK999AAD
124ABC004      122ABC992      ABL999AAE
```

Incremental Alphanumeric Dynamic Data Fields Command : ALPHA

This Alpha command is a modified version of the standard Alpha command. Do not use it as a substitute for standard alphanumeric command; use it only to automatically increment alphanumeric dynamic data fields. Refer to standard Alpha command instructions for parameters not covered below.

Use this Alpha command to specify the position and size of the incremental dynamic data field under the create form mode. The STEPMASK and STARTDATA parameters are entered in the execute command under the execute forms mode. The starting data for both standard and incremental dynamic data fields can be changed without changing the form definition program. You can change the incremental parameters for a new print job without changing the form definition program.

Incremental Alphanumeric Dynamic Data Fields Command Syntax:

ALPHA<LF>
[R[D];][E;][Cn;]**[IAFn;L**;[DIR;]SR;SC;VE;HE;<LF>
STOP<LF>

Incremental Alphanumeric Dynamic Data Field Parameters (Continued):

The following Alpha parameters are unique to the Incremental Alphanumeric Dynamic Data Field command. These parameters must be used to enable the dynamic entry of STEPMASK and STARTDATA parameters during the Execute Forms Mode.

IAFn Increment Alpha Field: Identifies the Alpha command as the Incremental Alphanumeric Dynamic Data Fields command. The n parameter numbers the data field for form location. Enter IAF and replace n with a number (1 to 255). The SR (Starting Row) and SC (Starting Column) parameters entered in the standard Alpha command specify the exact location of this data field number on the form.

L Length: Enter a number (1 to 226) to specify the field length for STARTDATA. The number of characters dynamically entered for the STARTDATA parameter must be equal to or less than the value entered for L. Refer to the Execute Incremental Dynamic Data section for details.

Example: Set up several fields to be dynamically entered and printed under the Execute Mode.

Incremental Alphanumeric Dynamic Data Fields Command Programming Example:

```
ALPHA
AF1;8;9;5;0;0        /9-character field; print at SR 9, SC
AF2;26;13;5;0;0      /26-character field; print at SR 13, SC 5
AF3;8;16;5;0;0       /8-character field; print at SR 16, SC 5
AF4;10;16;28;0;0     /10-character field; print at SR 16, SC 28
STOP
```

Note: Refer to Execute Dynamic Alphanumeric Data for print sample.

Duplicating Incremental Alphanumeric (or Bar Code) Fields

The Horizontal Duplication (HDUP) and Vertical Duplication (VDUP) commands explained later in this chapter can be used to duplicate incremental alphanumerics or bar codes. When these commands are used to duplicate fixed or dynamic data, fields are incremented in a left-to-right, top-to-bottom order.

The example below illustrates duplicated incremental fields with HDUP=3 (3 across) and VDUP=2 (2 down):

	Value	Description
STEPMASK	01	Increment alpha field
STARTDATA	AA	
Results	AA AB AC	Form 0
	AD AE AF	
	AG AH AI	Form 1
	AJ AK AL	

Note: Spacing is determined by the HDUP and VDUP commands. Results shown for bar codes would be actual bar code symbols as opposed to the letters.

Box Command : BOX

Boxes can be created using the Box command sequence. Parameters are used to define the starting row and column (upper left corner) and ending row and column (lower right corner) positions. Line thickness, size, and position are also user defined. Single, multiple, and overlapping boxes can be printed in vertical/horizontal orientation.

BOX Command Syntax:

BOX<LF>
LT;SR;SC;ER;EC<LF>
STOP<LF>

BOX Parameters:

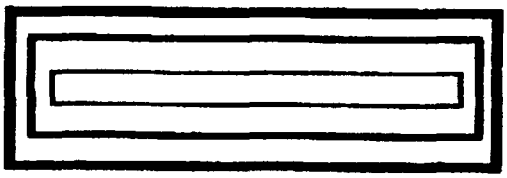
BOX	Boxes extend down and to the right from the starting row and column position (defined by the SR and SC parameters).
LT	Line Thickness: This parameter specifies the line thickness in dots. Enter a value of 1 or greater for the number of dots.
SR	Starting Row: The SR value specifies the starting row of the box. Replace SR with a numeric value (1 to one less than the length of the form). Character row or dot row is determined by the Scale command or the CP.DP format.
SC	Starting Column: The SC value specifies the starting column of the box. Replace SC with a numeric value (1 to one less than the width of the form). Character column or dot column is determined by the Scale command or the CP.DP format.
ER	Ending Row: The ER value specifies the ending row of the box. Replace ER with a numeric value (2 through the last row of the form). ER must be greater than SR. Character row or dot row is determined by the Scale command or the CP.DP format.
EC	Ending Column: The EC value specifies the ending column of the box. Replace EC with a numeric value (2 through the last column of the form). EC must be greater than SC. Character column or dot column is determined by the Scale command or the CP.DP format.
STOP	Stop terminates this command and causes the printer to wait for a new command. If STOP is not entered, the printer will wait for another set of Box command parameters.

Box Command Programming Example (Print three concentric boxes):

```
~CREATE;3BOXES      /create form for box example
BOX
3;35;25;40;50       /large box; 3-dot border
2;36;26;39;49       /middle; 2-dot border
1;37;27;38;48       /small; 1-dot border
STOP                /terminate Box command
END                 /terminate Create Mode
~EXECUTE;3BOXES     /print box example

~NORMAL             /return to Normal Mode
```

Print Sample



Corner Command : CORNER

Corners are created using the Corner command sequence. Parameters define the starting row and column (upper left corner) and ending row and column (lower right corner) positions. Line thickness and arm lengths are also user-defined. The four corners are printed in vertical/horizontal orientation. Variable rotation of corners is not provided.

CORNER Command Syntax:

CORNER<LF>
LT;SR;SC;ER;EC;VL;HL<LF>
STOP<LF>

CORNER Parameters:

CORNER — The Corner command. Corners will be extended down and to the right from the starting row and column position (defined by the SR and SC parameters).

LT — Line Thickness: This parameter specifies the line thickness, measured in dots. Enter a value (1 or greater) for the number of dots.

SR — Starting Row: The SR value specifies the starting row of the corner. Replace SR with a numeric value (1 to one less than the length of the form). Character row or dot row is determined by the Scale command or the CP.DP format.

SC — Starting Column: The SC value specifies the starting column of the corner. Replace SC with a numeric value (1 to one less than the width of the form). Character column or dot column is determined by the Scale command or the CP.DP format.

ER — Ending Row: The ER value specifies the ending row of the corner. Replace ER with a numeric value (2 through the last row of the form). ER must be greater than SR. Character row or dot row is determined by the Scale command or the CP.DP format.

EC — Ending Column: The EC value specifies the ending column of the corner. Replace EC with a numeric value (2 through the last column of the form). EC must be greater than SC. Character column or dot column is determined by the Scale command or the CP.DP format.

CORNER Parameters (Continued):

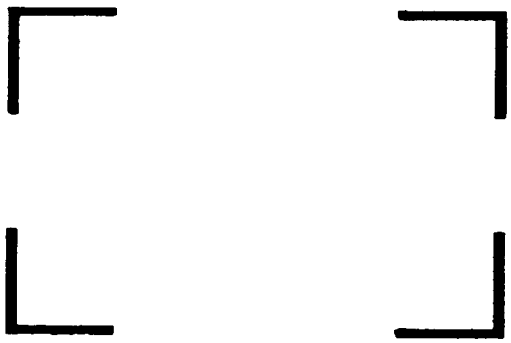
VL Vertical Length: The VL value specifies the length of the vertical arm of each of the four corners. Replace VL with a numeric value (1 or greater). Character or dot column format is determined by the Scale command or the CP.DP format.

HL Horizontal Length: The HL value specifies the length of the horizontal arm of each corner in the set. Replace HL with a numeric value (1 or greater). Character or dot column format is determined by the Scale command or the CP.DP format.

STOP Stop terminates this command and causes the printer to wait for a new command. If STOP is not entered, the printer will wait for another set of Corner command parameters.

Programming Example (Create a set of four corners):

```
~CREATE;CORNERS        /create form for corners
CORNER                 /Corner thickness is 3 dots,
3;25;25;35;50;3;5      /3 rows high and 5 columns wide
STOP                   /terminate Corner command
END                    /terminate Create Mode
~EXECUTE;CORNERS       /print corners
```



```
~NORMAL                /return to Normal Mode
```

Print Sample

End Command : END

The End command is used to terminate the current mode of operation. It must be used before entering a new mode command (Normal, Create, Logo, or Execute). In addition to terminating the current mode, the End command initiates the following printer functions:

- Program errors are cleared out.
- Error-free sections of the current form program are stored.
- SmartGraphics returns to the Normal (default) mode.

Note: The Debug debug slash (/) included in the Create command will result in the printing of any applicable error messages.

END Command Syntax:

END<LF>

END Parameters:

END The End command is used to terminate the current mode of operation before issuing a new mode command.

For an example, refer to the example for the CORNER command.

Form Length : LFORM6 / LFORM8

Two commands are provided for setting the form length to a specified number of lines per form. Form length can be set in 6 or 8 lpi (lines per inch) values. The two Form Length commands are:

Form Length Command Syntax:

LFORM6;nnnn<LF> or LFORM8;nnnn<LF>

Form Length Parameters:

LFORM6 The Form Length command for 6 lpi forms.

LFORM8 The Form Length command for 8 lpi forms.

nnnn Specifies the forms length in total number of lines allowed per form. Replace nnnn with the desired the number of lines:

1 - 5461 lines for 6 lpi forms;
1 - 7281 lines for 8 lpi forms.

A value that exceeds the maximum number of lines will result in an error message.

Programming Example (Set a form length of 11" at 8 lpi):

LFORM8;88

Note: LFORM commands affect printed text only, not the printer emulation setting for lpi. The LFORM6 and LFORM8 commands are the equivalent of the printer set to “data processing mode”; 12 dot rows per line at 6 lpi or 9 dot rows at 8 lpi.

Horizontal Duplication Command : HDUP

This command is used to duplicate (repeat) form elements. It specifies the number of times the elements are to be duplicated horizontally as well as the spacing between each duplication. The command for the elements to be duplicated is placed after the HDUP command.

The HDUP command can also be used to modify incremental data output (refer to Duplicating Incremental Alphanumeric Data).

HDUP Command Syntax:

HDUP;DN;OF<LF>
(Elements to be Duplicated)
HDUP;OFF<LF>

HDUP Parameters:

HDUP	The Horizontal Duplication command.
DN	Duplication Number: The DN value specifies the number of times the entered form elements will be repeated horizontally. Replace DN with a numeric value (1 to 255).
OF	Offset (starting column to starting column): The OF value specifies the horizontal spacing between each duplication of the form elements. Replace OF with a number based on dot or character columns as determined by the Scale command or the CP.DP format.
HDUP;OFF	Terminates the Horizontal Duplication command. If not entered, the printer waits for another form element to be specified. A variety of element types can be specified for duplication within one duplication command.

Programming Example (Duplicate staggered vertical lines to create a border effect):

```
~CREATE;BORDER
HDUP;5;9                /repeat 5 times with 9-column offset
VERT                    /Vertical Line command
1;5;9;10                /line thickness=1; column 5; SR=9; ER=10
1;6;8;10
1;7;7;9
1;8;6;8
1;9;5;7
1;10;6;8
1;11;7;9
1;12;8;10
1;13;9;10
STOP                    /terminate Vertical Line command
HDUP;OFF                /terminate Horizontal Duplication
END                     /terminate Create Mode
~EXECUTE;BORDER         /print zigzag lines

~NORMAL                 /return to Normal Mode
```

Print Sample

Horizontal Lines Command : HORZ

This command is used to create a horizontal line. Line thickness, position, and length are user specified. The command syntax is as follows:

HORZ Command Syntax:

HORZ<LF>
LT;R;SC;EC<LF>
STOP<LF>

HORZ Parameters:

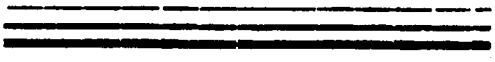
HORZ	The Horizontal Line command.
LT	Line Thickness: The LT parameter specifies the line thickness in terms of dots. Replace LT with a numeric value (1 or greater) to indicate the number of dots. Line thickness extends downward from the starting row.
R	Row: The R parameter specifies the row where the horizontal line will be drawn. Replace R with a row value (1 to one less than the length of the form). Character row or dot row is determined by the Scale command or the CP.DP format.
SC	Starting Column: The SC value specifies the starting column of horizontal line. Replace SC with a numeric value (1 to one less than the width of the form). Character column or dot column is determined by the Scale command or the CP.DP format.
EC	Ending Column: The EC value specifies the ending column of the horizontal line. Replace EC with a numeric value (2 to the last column of the form). EC must be greater than SC. Character column or dot column is determined by the Scale command or the CP.DP format.
STOP	Stop terminates this command and causes the printer to wait for a new command. If STOP is not entered, the printer will wait for another set of Horizontal Line command parameters.

Programming Example (Create two horizontal lines of different thickness):

```
~CREATE;LINES
HORZ
1;25;25;50          /line thickness is 1 dot
2;25.6;25;50        /line thickness is 2 dots;
3;26;25;50          /CP.DP format used
STOP                /line thickness is 3 dots
END
~EXECUTE;LINES

~NORMAL
```

Print Sample



Logo Call Command : LOGO

A logo is actually created under the Create Logo Mode command. The Logo Call command selects a previously defined logo and positions it on the form.

LOGO Command Syntax:

LOGO<LF>
SR;SC;LOGO NAME<LF>
STOP<LF>

LOGO Parameters:

LOGO	The Logo Call command.
SR	Starting Row: The SR value specifies the starting row of the logo (based on the upper left corner of the logo grid). Replace SR with a numeric value (1 to one less than the length of the form). Character row or dot row is determined by the Scale command or the CP.DP format.
SC	Starting Column: The SC value specifies the starting column of the logo (based on the upper left corner of the logo grid). Replace SC with a numeric value (1 to one less than the width of the form). Character column or dot column is determined by the Scale command or the CP.DP format.
LOGO NAME	Name given the logo when created. Replace LOGO NAME with the desired logo name (up to 8 characters); this entry must match the logo name stored in the printer directory.
STOP	Stop terminates this command and causes the printer to wait for a new command. If STOP is not entered, the printer will wait for another set of Logo Call command parameters.

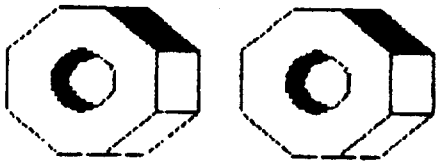
Example: Call a previously defined logo named NUT and print the logo two times (see logo definition under Create Logo command in this chapter).

LOGO Programming Example:

```
~CREATE;NUTZ;0      /create form for nuts
LOGO
15;15;NUT           /print at SR 15; SC 15
15;27;NUT           /print at SR 15; SC 27
STOP                /terminate Logo command
END                 /terminate Create Mode
~EXECUTE;NUTZ       /print nuts

~NORMAL             /return to Normal Mode
```

Print Sample



Page Number Command : PAGE

This command specifies the positioning of the page number on the form. In order for the printer to automatically increment page numbers on successive copies of the form, the starting page number must be defined with the Execute commands optional parameter, Page n. See the EXECUTE command's description in this chapter.

PAGE Command Syntax

PAGE;SR;SC<LF>

PAGE Parameters:

PAGE	The Page Number command.
SR	Starting Row: The SR value specifies the starting row of the page number. Replace SR with a numeric value (1 to one less than the length of the form). Character row or dot row is determined by the Scale command or the CP.DP format.
SC	Starting Column: The SC value specifies the starting column of the page number. Replace SC with a numeric value (1 to one less than the width of the form). Character column or dot column is determined by the Scale command or the CP.DP format.

Programming Example (Position the page number at row 62 and column 42):

```
~CREATE;PAGENUM
PAGE;62;42
ALPHA
6.8;20;0;0;"THIS DEMONSTRATES PAGE NUMBERING"
STOP
END
~EXECUTE;PAGENUM

~NORMAL
```

Reverse Print Command : REVERSE

This command specifies an area of the form for reverse printing (white on black). Two densities of black background are available: the standard density background uses odd dot plotting; the higher density background uses both odd and even dot plotting. Use the denser background when more contrast is desired.

Form elements within the reverse print field are printed white on black. Reverse print can be used for the following:

- Standard (10 cpi) and expanded characters.
- Rotated standard (10 cpi) and expanded characters.
- Logos and all form elements (lines, boxes, etc.).

The Reverse Print feature is not provided for bar codes and compressed print. The command syntax is as follows:

REVERSE Command Syntax

```
REVERSE<LF>
[DARK;]SR;SC;ER;EC<LF>
STOP<LF>
```

REVERSE Parameters:

REVERSE	The Reverse Printing command.
DARK	An optional parameter used to designate denser black background (odd and even dot plotting). The standard or default is lighter background (odd dot plotting only). Enter DARK if you wish to select the denser background.
SR	Starting Row: The SR value specifies the starting row of the reverse print field. Replace SR with a numeric value (1 to one less than the length of the form). Character row or dot row is determined by the Scale command or the CP.DP format.
SC	Starting Column: The SC value specifies the starting column of the reverse print field. Replace SC with a numeric value (1 to one less than the width of the form). Character column or dot column is determined by the Scale command or the CP.DP format.

REVERSE Parameters (Continued):

ER — Ending Row: The ER value specifies the ending row of the reverse print field. Replace ER with a numeric value (2 through the last row of the form). ER must be greater than SR. Character row or dot row is determined by the Scale command or the CP.DP format.

EC — Ending Column: The EC value specifies the ending column of the reverse print field. Replace EC with a numeric value (2 through the last column of the form). EC must be greater than SC. Character column or dot column is determined by the Scale command or the CP.DP format.

STOP — Stop terminates this command and causes the printer to wait for a new command. If STOP is not entered, the printer will wait for another set of Reverse Print command parameters.

Programming Example (Set page header bar for reverse print - high density):

```
~CREATE;HEADER
REVERSE
6;15;8;60                    /print at SR 6, SC 15, ER 8, EC 60
STOP
ALPHA
6.8;20;0;0;"TEXT IN HEADER AREA PRINTS REVERSED"
STOP
END
~EXECUTE;HEADER
```

```
~NORMAL
```

Print Sample

Scale Command : SCALE

The Scale command determines data positioning by specifying the scale factor to be used; either dot scale or character scale. Certain commands position data by parameters that specify starting row and column (SR and SC) and ending row and column (ER and EC). If the Scale command specifies dot scale, then data will be positioned at the dot row and dot column specified by the applicable command parameter. Otherwise, data will be positioned at the character row and character column.

A standard 8 1/2 x 11 inch form (at the default setting, 6 lpi and 10 cpi) contains the following number of rows and columns:

Scale	# Rows	# Columns
Character	66	80
Dot	792	720

Either of the Scale commands can be issued at any time during forms creation. Scale commands become active at the point of insertion. Prior elements are printed at the former scale; elements that follow a change will be printed at the scale designated.

The Scale command does not affect the size of the printed data itself. Text printed at 6 lpi and 10 cpi will continue to be printed at 6 lpi and 10 cpi after a Scale change. Just the position of the data will be affected.

SCALE Command Syntax:

SCALE;DOT<LF>
 -or-
SCALE;CHAR[;LPI;CPI] <LF>

SCALE Parameters:

SCALE	The Scale command.
DOT	Specifies the dot scale.
CHAR	Specifies the character scale.
LPI	Lines Per Inch (default is 6 lpi): An optional vertical line spacing parameter for character scaling. Valid entries are 6, 8, 9 or 10.
CPI	Characters Per Inch (default is 10 cpi): An optional horizontal pitch parameter for character scaling. Valid entries are 10, 13, 15, and 17.

Programming Example (Set character scale at 8 lpi and 17 cpi):

SCALE;CHAR;8;17

Scale and Character/Dot Position Format Command: CP.DP command CP.DP

Note: Scale has no effect on the CP.DP Format command; each command is independent of the other.

The CP.DP format is most commonly used to adjust starting and ending print Position data positions. When printing alphanumeric data (text) on a form, it is normal to have a line or box occupying the same position as the intended text. To avoid overprinting, CP.DP format values are entered to immediately precede the starting row (SR) and/or starting column (SC) parameters, thus offsetting the text.

The CP value indicates the Cell position cell position; the DP value indicates the Dot position dot position with that cell. When printing at 6 lpi and 10 cpi, each character position or cell is 12 dot rows high by 6 dot columns wide. A CP.DP format preceding an SC (starting column) dictates the starting dot position down in the cell; a CP.DP value preceding an SR (starting row) dictates the starting dot position to the right within the cell.

In the Execute LABEL example shown later in this chapter, the top line of a box prints at SC 2 and SR 6. In order to drop the title (“CATALOG NO.”) below this line, the subsequent ALPHA command calls for print at starting row CP.DP position 6.6. Figure 3-1 is a graphic illustration of the effect of this CP.DP positioning.

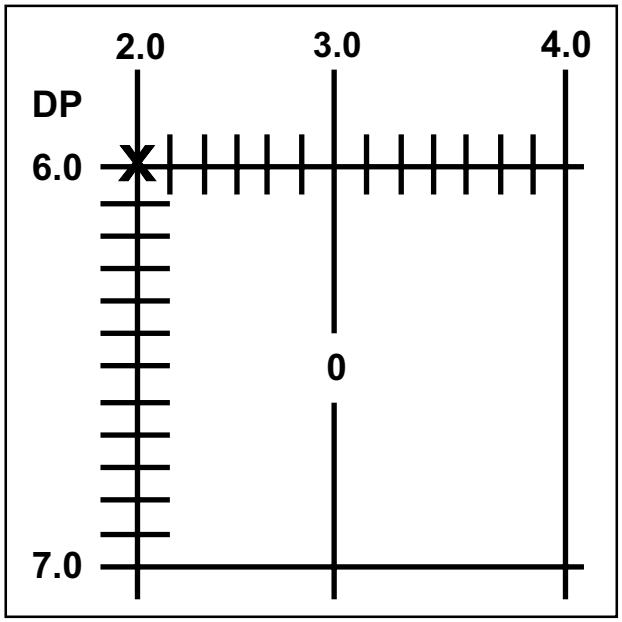


Figure 3-1: Character Cell Grid (6 x 12 dots). X represents upper left box corner; 0 is the starting dot position for text.

The Execute LABEL example utilizes CP.DP positioning for both SR and SC parameters.

Vertical Duplication Command: VDUP

This command is used to duplicate (repeat) form elements. It specifies the number of times the elements are to be duplicated vertically, as well as the spacing between each duplication. The command for the elements to be duplicated is placed after the VDUP command. The VDUP command can also be used to modify incremental data output (refer to Duplicating Incremental Alphanumeric Data).

VDUP Command Syntax:

VDUP;DN;OF<LF>
(elements to be duplicated)
VDUP;OFF<LF>

VDUP Parameters:

VDUP The Vertical Duplication command.

DN Duplication Number: The DN value specifies the number of times the entered form elements will be repeated horizontally. Replace DN with a numeric value (1 to 255).

OF Offset (starting column to starting column): The OF value specifies the vertical spacing between each duplication of the form elements. Replace OF with a number based on dot or character columns as determined by the Scale command or the CP.DP format.

VDUP Parameters (Continued):

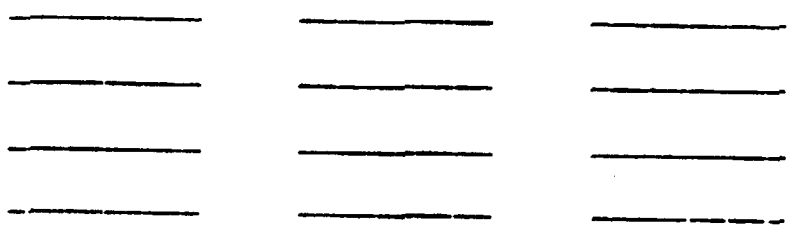
VDUP;OFF Terminates the Vertical Duplication command. If not entered, the printer waits for another form element to be specified. A variety of element types can be specified for duplication within one duplication command.

Programming Example (Create three columns, four blank lines each):

```
~CREATE;BLANKS
VDUP;4;2                /repeat 4 times with 2-column offset
HORZ                    /Horizontal Line command
1;25;10;20              /print at row 25, SC 10, EC 20
1;25;25;35
1;25;40;50
STOP                    /terminate Horizontal Line command
VDUP;OFF                /terminate Vertical Duplication
END
~EXECUTE;BLANKS         /print form

~NORMAL                 /return to Normal Mode
```

Print Sample



Note: Position of print sample does not necessarily reflect actual print position.

Vertical Lines Command : VERT

This command is used to create a vertical line. Line thickness, position, and length are user specified. The command syntax is as follows:

VERT Command Syntax:

```
VERT<LF>
LT;C;SR;ER<LF>
STOP<LF>
```

VERT Parameters:

VERT The Vertical Line command.

LT Line Thickness: The LT parameter specifies the line thickness in terms of dots. Replace LT with a numeric value (1 or greater) to indicate the number of dots. Line thickness extends to the right from the starting column.

VERT Parameters (Continued):

C — Column: The C parameter specifies the column at which the vertical line will be drawn. Replace C with a value (1 to one less than the width of the form). Character row or dot row is determined by the Scale command or the CP.DP format.

SR — Starting Row: The SR value specifies the starting row of the vertical line. Replace SR with a numeric value (1 to one less than the length of the form). Character column or dot column is determined by the Scale command or the CP.DP format.

ER — Ending Row: The ER value specifies the ending row of the vertical line. Replace ER with a value (2 to the last row of the form). ER must be greater than SR. Character column or dot column is determined by the Scale command or the CP.DP format.

STOP — Stop terminates this command and causes the printer to wait for a new command. If STOP is not entered, the printer will wait for another set of Vertical Line command parameters.

Programming Example (Create three columns, four blank lines each):

```
~CREATE;3LINES
VERT
3;10;50;55          /line thickness is 3 dots
2;15;50;55          /line thickness is 2 dots
1;20;50;55          /line thickness is 1 dot
STOP
END
~EXECUTE;3LINES     /print form

~NORMAL             /return to Normal Mode
```

Print Sample

Create Logo Mode : LOGO

Use this command to design and create a logo. You must define the overall grid size in dots, then define the specific dot and/or series of dots to be printed in each grid row. The upper left corner of the logo grid is the starting row (SR) and starting column (SC) parameters for the Logo Call command.

A logo grid contains 72 dots per inch vertically and 60 dots per inch horizontally. The largest logo allowed is 252 dot rows high (3.5 inches) and 240 dot columns wide (4 inches). A maximum of 16 number logos can be created and stored in memory.

Note: Do not specify grid dimensions substantially larger than required by the logo; you will waste SmartGraphics memory which will restrict other features that you may want to use.

LOGO Command Syntax:

<SFCC>LOGO;LOGO NAME;VL;HL<LF>
RN;D;D1-D2;D<LF>
END<LF>

LOGO Parameters:

<SFCC> Represents the Special Function Control Character. Unless changed by strapping option, enter ~ (default).

LOGO The Logo command.

LOGO NAME Defines the name of the logo being created. The logo name may contain a maximum of eight alphanumeric characters. No spaces, semicolons, slashes or the SFCC are allowed. Be careful: An existing logo with the same name will be overwritten and replaced by the new logo. Any future editing, executing, or deleting of the logo (e.g., Delete Logo or Logo Call commands) must be done using the assigned name. A maximum of 16 logos can be stored in printer memory.

VL Vertical Length (252 maximum): The VL value specifies the overall vertical length of the logo grid in dot rows. Replace VL with a sufficient numeric value (not to exceed 252). Remember, oversizing wastes memory.

HL Horizontal Length (240 maximum): The HL value specifies the overall horizontal length of the logo grid in dot rows. Replace HL with a sufficient numeric value (not to exceed 240). Remember, oversizing wastes memory.

RN Row Number: The RN value specifies the row number for this row of dots in the logo grid. Use a separate command line for each row number. Rows are numbered (1 to 252 maximum) from the top down.

D Dot (single): D specifies a single dot position to be printed within a row. More than one entry per line is allowed. Enter each dot number desired, separating each entry with a semicolon. Dots are numbered (1 to 240 maximum) from left to right.

LOGO Parameters (Continued):

D1-D2 Dots (series): Use these parameters to specify a range or series of dot positions (left to right) to be printed within the row. The starting (D1) and the ending (D2) positions will also be printed. Single dots and a series of dots can be combined in the same command line. Enter the desired series (1-240, minimum and maximum), separating each series with a semicolon.

END END terminates Create Logo Mode.

Programming Example (Create a logo to resemble a hexagonal nut approximately 1 x 1"):

```
~LOGO;NUT;72;60          /logo grid set at 72 x 60
1;17-44                  /row number; dots to be printed
2;16;29;45
3;15;28;46
4;14;27;47
5;13;26;48
6;12;25;49
7;11;24;50
8;10;23;51
9;9;22;52
10;8;21;53
11;7;20;54
12;6;19;55
13;5;18;56
14;4;17;57
15;3;16;58
16;2;15;59
17;1-14;36-38;60
18;1;14;34-40;60
19;1;14;32-42;60
20;1;14;31;34-43;60
21;1;14;30;36-44;60
22;1;14;29;38-44;60
23;1;14;28;39-45;60
24;1;14;28;39-45;60
25;1;14;27;40-46;60
26;1;14;27;40-46;60
27;1;14;27;41-46;60
28;1;14;27;41-46;60
29;1;14;27;41-46;60
30;1;14;27;41-46;60
31;1;14;27;40-46;60
32;1;14;27;40-46;60
33;1;14;28;39-45;60
34;1;14;28;39-45;60
35;1;14;29;38-44;60
36;1;14;30;36-44;60
37;1;14;31;34-43;60
38;1;14;32-42;60
39;1;14;34-40;60
40;1-14;36-38;60
41;2-15;59
42;3-16;58
43;4-17;57
44;5-18;56
```

Create Logo Mode Programming Example (Continued):

```
45;6-19;55
46;7-20;54
47;8-21;53
48;9-22;52
49;10-23;51
50;11-24;50
51;12-25;49
52;13-26;48
53;14-27;47
54;15-28;46
55;16-29;45
56;17-44
END                          /terminate Logo command
~CREATE;1NUT;0               /create form for nut logo
LOGO                         /logo call command; note lack of SFCC
15;15;NUT                    /print at SR 15; SC 15
STOP                         /terminate Logo command
END                          /terminate Create Mode
~EXECUTE;1NUT                /print nut logo

~NORMAL                      /return to Normal Mode
```

Print Sample

Execute Form Mode Command : EXECUTE

The Execute Form Mode command is used to print a form. This command can be used only after the form has been created under the Create Form Mode.

The Execute command provides:

- Optional page numbering
- Optional form count for printing multiple copies
- Print format commands (e.g., lpi, elongation, and plot mode)
- Compressed and expanded print commands
- Vertical spacing commands
- Alternate character set selection

Forms can be printed with static (fixed) and/or variable data entry. The following data can be input during the Execute Form Mode:

- Page numbers
- Alphanumeric dynamic and overlay data fields
- Bar code dynamic data fields

Variable data entry must have been established by the Alpha and bar code command parameters during the Create Form Mode. Additional Execute parameters are provided for printing such alphanumeric and bar code data on the form.

With respect to incremental data, there are two formats of the Execute command: a standard version that executes non-incremental or fixed incremental data, and another one to execute incremental dynamic data (refer to Execute Incremental Data).

EXECUTE Command Syntax:

<SFCC>EXECUTE;FORM NAME[;PAGE n][;FC]<LF>
[Overlay Data]<LF>
[<SFCC>AFn;(D)ASCII TEXT(D)]<LF>
[<SFCC>BFn;(D)DATA FIELD(D)]<LF>

<SFCC>NORMAL<LF>

EXECUTE Parameters:

<SFCC> The Special Funtion Control Character.

EXECUTE The Execute Form Mode command.

FORM NAME Name given the form when created. Replace FORM NAME with the desired form name (up to 8 characters); this entry must match the form name stored in the printer directory.

PAGE n Optional pagination command: Enter PAGE, a space, and then the starting Page number page number (between 0 and 99999999). A maximum of eight digits is allowed; the next page after 999999999 is 00000000. Page number print position is determined by the Page Number command under the Create Form Mode.

FC Form Count (default is 1): An optional parameter used to specify the number of copies of the form to be printed. Replace FC with the desired number (2 or greater). SmartGraphics automatically returns to the Normal Mode after the last page is printed, do not use the FC parameter if dynamic or overlay data is to be entered.

Overlay Data Overlay data can be entered as part of the Execute command. If used, this line can be replaced with multiple lines of overlay data. Refer to the Execute Overlay Data instructions that follow the syntax explanation.

AFn;(D)ASCII TEXT(D) The Execute Dynamic Alphanumeric Data Command. Refer to the Execute Dynamic Alphanumeric Data instructions that follow the syntax explanation.

EXECUTE Parameters (Continued):

BFn;(D)ASCII TEXT(D) The Execute Dynamic Bar Code Data command. Refer to the Execute Dynamic Bar Code Data instructions that follow the syntax explanation.

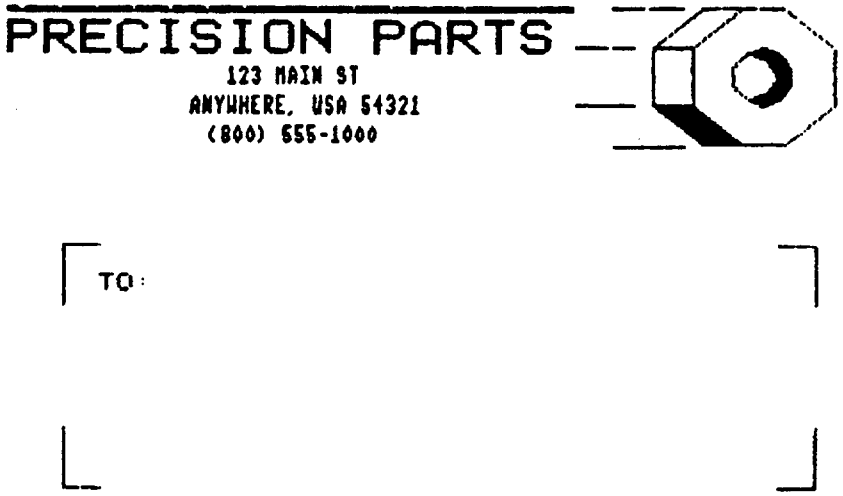
Normal The Normal Mode command. This is not required if the FC parameter was used. Enter the SFCC character and NORMAL to return to the Normal Mode. This command must follow all other Execute commands to allow for variable data entry (refer to the following instructions). A blank line must precede the Normal command.

Programming Example (Create and print a 3 x 5" mailing label with company logo, name, and address):

```
~CREATE;LABEL;216                    /create 3" label form
HORZ                                 /Horizontal Line
2;1;2;33
1;1;35;39
1;2.4;33;36.2
1;4.3;33;36.2
1;5.8;35;39
STOP
CORNER                               /Corner command
1;9;5;17;46;2;2                      /line thickness 1
STOP
ALPHA                                /Alpha command
2;2;2;2;"PRECISION PARTS"            /co. name and address
C15;3;14;0;0;"123 MAIN ST"
C15;4;12;0;0;"ANYWHERE, USA 54321"
C15;5;13;0;0;"(800) 555-1000"
10;7;0;0;"TO:"
STOP
LOGO                                 /logo previously defined
1;37;NUT                             /print at SR 1, SC 37
STOP
END                                  /terminate Create Mode
~EXECUTE;LABEL                       /print one form

~NORMAL                              /return to Normal Mode
```

Print Sample



Note: Once created, LABEL forms can be printed by issuing the desired EXECUTE command sequence (see the following Overlay example).

Execute Overlay Data : EXECUTE

Overlay data is a type of variable alphanumeric data that can be entered during the Execute Form Mode. Imagine a form designed with blank areas yet to be filled in, and the overlay data as a transparency. The overlay text is entered in the exact position that fills in the blank areas when “overlaid” on the form.

The positioning of overlay data is accomplished with physical line feeds and spaces. For example, if the blank form area reserved for the customer name field begins at character row 12, column 20, you can enter 12 line feeds, press the space bar 20 times, and type the company name as the overlay data. Using this method, you can create an entire form as a page of overlay data.

Note: You must enter a form feed to separate each new page of overlay data.

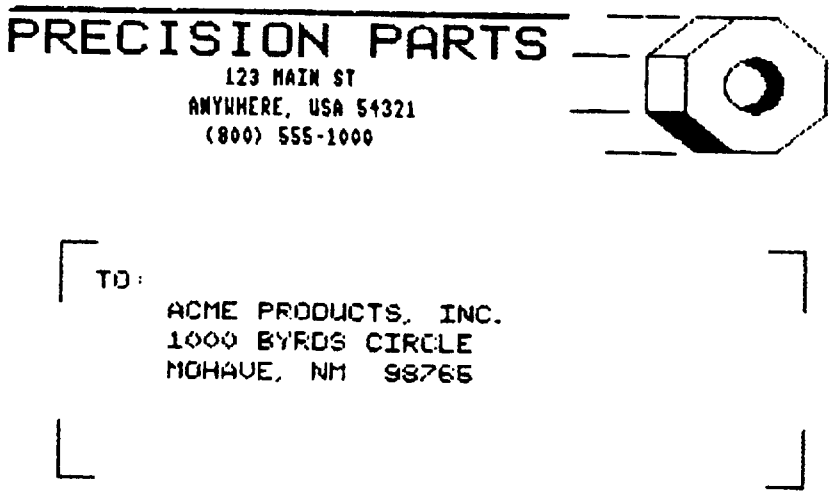
Example: Supply customer name and address overlay data for the LABEL form (created in previous Execute example).

EXECUTE Programming Example:

```
~EXECUTE;LABEL          /print one form
                        /insert 12 <LF>'s
ACME PRODUCTS, INC.     /space over 20 times
1000 BYRDS CIRCLE
MOHAVE, NM  98765

~NORMAL                 /return to Normal Mode
```

Print Sample



Execute Dynamic Alphanumeric Data : EXECUTE

Dynamic alphanumeric data is a type of variable data that can be entered during the Execute Form Mode. Unlike overlay data that is manually positioned when entered, dynamic data is located by specifying the actual data and location on the form.

Dynamic data position is established using the AFn;L parameters of the Alpha command in the Create Form Mode (refer to Alphanumeric Dynamic Data Fields Command). The data is input dynamically in the identified location each time the form is printed under the Execute command.

Note: You must enter a form feed to separate each new page (i.e., the Execute command, the dynamic fields and data, and the Normal command) of dynamic data.

Depending on the current mode status, all or part the following command syntax is required:

Execute Dynamic Alphanumeric Data Command Syntax:

<SFCC>EXECUTE;FORM NAME[;PAGE n]<LF>
<SFCC>AFn;(D)ASCII TEXT(D)<LF>
<SFCC>NORMAL<LF>

Execute Dynamic Alphanumeric Data Parameters:

<SFCC>	Represents the Special Function Control Character.
EXECUTE;FORM NAME [;PAGE n]	The Execute Form Mode command and form name as previously explained. This command line is not required if you are already in the Execute Form Mode and the form has been called.

Note: The Form Count (FC) parameter cannot by used for dynamic data entry; however, the optional page number parameter can be used.

Execute Dynamic Alphanumeric Data Parameters (Continued):

AFn	Alpha Field Identifier: The AF parameter identifies the dynamic data field being entered. Enter AF and replace n with the same number entered for the AFn;L parameter under the Alpha command during the Create Form Mode.
D	Delimiter: Used to denote the start and finish of the alphanumeric string. You may use any printable character other than a /, the SFCC, or a character used within the string itself. Quotation marks (“) are most commonly used to denote both ends of an alpha numeric string. The delimiter is not printed.
ASCII TEXT	The alphanumeric string to be printed. Enter any of the standard ASCII printable characters, except the character used as the delimiter or D parameter. The data is printed on the form at the location dictated by the n parameter reference. Print position is defined by the SR and SC parameters entered under the Alpha command during the Create Form Mode.
NORMAL	The Normal Mode command. After the last dynamic data command, enter the SFCC and NORMAL to return to the Normal Mode. Enter an <LF> (line terminator) to insert a blank line before the Normal command is entered.

You can repeat the AFn;(D)ASCII TEXT(D) sequence for every data field defined in the Create Form Mode. The Execute Dynamic Bar Code Data command can also be combined in the same Execute command sequence. Be sure to separate each page of dynamic data with a form feed.

Example: Create a shipping label that provides dynamic entry of these data fields: catalog number, description, part number, and serial number.

Execute Dynamic Alphanumeric Data Programming Example:

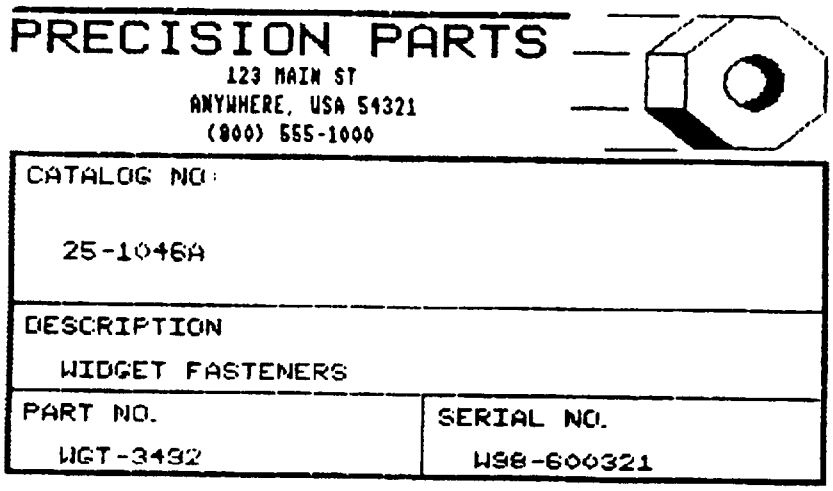
```
~CREATE;LABEL2;216              /create 3" label form
HORZ                            /Horizontal Line command
2;1;2;33
1;1;35;39
1;2.4;33;36.2
1;4.3;33;36.2
1;5.8;35;39
STOP
BOX                             /Box command
2;6;2;17;47                     /line thickness 2
STOP
HORZ                            /Horizontal Line Command
1;11;2;47
1;14;2;47
STOP
VERT                            /Vertical Line command
1;25;14;17
STOP
ALPHA                           /Alpha command
2;2;2;2;”PRECISION PARTS”       /name and address
C15;3;14;0;0;”123 MAIN ST”
C15;4;12;0;0;”ANYWHERE, USA 54321"
C15;5;13;0;0;”(800) 555-1000"
6.6;3;0;0;”CATALOG NO:”         /box titles
```

Execute Dynamic Alphanumeric Data Programming Example (Continued):

```
11.6;3;0;0;"DESCRIPTION"
14.6;3;0;0;"PART NO."
14.6;26;0;0;"SERIAL NO."
AF1;8;9;5;0;0                  /dynamic data: catalog no.
AF2;26;13;5;0;0                /description
AF3;8;16;5;0;0                 /part number
AF4;10;16;28;0;0               /serial number
STOP
LOGO                           /logo previously defined
1;37;NUT                       /print at SR 2, SC 37
STOP
END                            /terminate Create Mode
~EXECUTE;LABEL2                /print one form
~AF1;"25-1046A"                /dynamic entries: catalog no.
~AF2;"WIDGET FASTENERS"        /description
~AF3;"WGT-3492"                /part number
~AF4;"W98-600321"              /serial number

~NORMAL
```

Print sample



Execute Dynamic Bar Code Data : EXECUTE

Dynamic bar code data is a type of variable data that can be entered during the Execute Form Mode. A command sequence defines the actual bar code data and its location on the form.

Bar code data position is established using the BFn parameter of the Bar Code command in the Create Form Mode (refer to the applicable bar code command instructions). The bar code data is input dynamically in the identified location each time the form is printed under the Execute command.

Note: You must enter a form feed to separate each new page (i.e., the Execute command, the dynamic fields and data, and the Normal command) of bar code data.

Execute Dynamic Bar Code Data Command Syntax

<SFCC>EXECUTE;FORM NAME[;PAGE n]<LF>
<SFCC>BFn;(D)DATA FIELD(D)<LF>
<SFCC>NORMAL<LF>

Execute Dynamic Bar Code Data Parameters:

<SFCC>	Represents the Special Function Control Character.
EXECUTE;FORM NAME[;PAGE n]	The Execute Form Mode command and form name as previously explained. This command line is not required if you are already in the Execute Form Mode and the form has been called.

Note: The Form Count (FC) parameter cannot by used for dynamic data entry; however, the optional page number parameter can be used.

BFn	Bar Code Field Identifier: The BF parameter specifies a dynamic bar code field and identifies the field being supplied with data. Enter BF and replace n with the same number entered for the BFn parameter under the bar code command during the Create Form Mode.
D	Delimiter: Used to denote the start and finish of the alphanu meric string . You may use any printable character other than a /, the SFCC, or a character used within the string itself. Quotation marks (“) are most commonly used to denote both ends of an alphanumeric string. The delimiter itself is not printed.
DATA FIELD	Enter the characters for the bar code data. The type of characters allowed depends on the type of bar code used. Refer to the applicable bar code Data Field instructions for allowable types.
NORMAL	The Normal Mode command. After the last dynamic data command, enter the SFCC and NORMAL to return to the Normal Mode. Enter an <LF> (line terminator) to insert a blank line before the Normal command is entered.

You can repeat the BFn;(D)DATA FIELD(D) sequence for every bar code field defined in the Create Form Mode. The Execute Dynamic Alphanumeric Data command can also be combined in the same Execute command sequence. Be sure to separate each page of dynamic data with a form feed.

Example: Add a bar code to the shipping label to represent the catalog number.

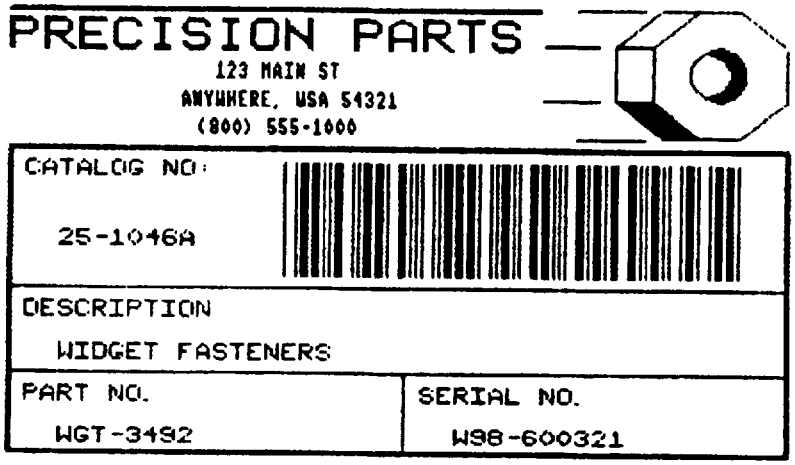
Note: Adding an element to the label means that the form must be redefined.

Execute Dynamic Bar Code Data Programming Example:

```
~CREATE;LABEL2;216                  /create 3" label form
HORZ                                /Horizontal Line command
2;1;2;33
1;1;35;39
1;2.4;33;36.2
1;4.3;33;36.2
1;5.8;35;39
STOP
BOX                                 /Box command
2;6;2;17;47                         /line thickness 2
STOP
HORZ                                /Horizontal Line command
1;11;2;47
1;14;2;47
STOP
VERT                                /Vertical Line command
1;25;14;17
STOP
ALPHA                               /Alpha command
2;2;2;2;"PRECISION PARTS"           /name and address
C15;3;14;0;0;"123 MAIN ST"
C15;4;12;0;0;"ANYWHERE, USA 54321"
C15;5;13;0;0;"(800) 555-1000"
6.6;3;0;0;"CATALOG NO:"             /box titles
11.6;3;0;0;"DESCRIPTION"
14.6;3;0;0;"PART NO."
14.6;26;0;0;"SERIAL NO."
AF1;8;9;5;0;0                       /dynamic data: catalog no.
AF2;26;13;5;0;0                     /description
AF3;8;16;5;0;0                      /part number
AF4;10;16;28;0;0                    /serial number
STOP
BARCODE                             /Bar Code command
C3/9;BF1;7;25                       /type and print position
STOP
LOGO                                /logo previously defined
1;37;NUT                            /print at SR 2, SC 37
STOP
END                                 /terminate Create Mode
~EXECUTE;LABEL2                     /print one form
~AF1;"25-1046A"                     /dynamic entries: catalog no.
~AF2;"WIDGET FASTENERS"             /description
~AF3;"WGT-3492"                     /part number
~AF4;"W98-600321"                   /serial number
~BF1;"25-1046A"                     /bar code

~NORMAL
```

Print Sample



Supplying Incremental Dynamic Data

Incremental dynamic data fields are defined under the Create Form Mode refer to applicable Incremental Alpha or Bar Code commands. The incremental data itself is “dynamically” entered during the Execute Form Mode. Corresponding incremental data fields must be supplied with the Execute command; otherwise, dynamic data fields specified in the Create Form Mode will not be printed on the form.

Incremental dynamic data, either alphanumeric or bar code data; is supplied at the top of the form prior to any overlay data. It can be changed with each new batch of forms. The command formats for supplying incremental alphanumeric and bar code dynamic data are basically the same.

Supplying Incremental Dynamic Data Command Syntax:

Incremental dynamic alphanumeric data:
<SFCC>IAFn;[idir]STEPMASK;[RPTnnn;][RSTnnn;](D)STARTDATA(D)

Incremental dynamic bar code data:
<SFCC>IBFn;[idir]STEPMASK;[RPTnnn;][RSTnnn;](D)STARTDATA(D)

Supplying Incremental Dynamic Data Parameters:

<SFCC>	The Special Function Control Character.
IAF	Incremental Alphanumeric Dynamic Data parameter.
IBF	Incremental Bar Code Dynamic Data parameter.
n	Field number identifier: The number of the dynamic data field as entered in the Create Form Mode. Replace n with the same number entered for this field in the AF or BF parameter. Refer to applicable Alpha or Bar Code command.

Supplying Incremental Dynamic Data Parameters (Continued):

idir Increment Direction (default is to increment): An optional parameter used to specify the arithmetic effect of the step on the data field. + (or leave blank) to increment or - to decrement the data field.

STEPMASK Specifies the increment amount (step), data field length, and mask to control incrementing. Refer to Incrementing Alphanumeric Data or Incremental Bar Code Data for details.

RPTnnn Repeat Count (default is 1; i.e., increment with each printing): An optional parameter used to specify the number of times to repeat a field value before incrementing it. This feature is useful for printing multiple copies of a form (such as a label) before changing the data field. To use this option, enter RPT and replace nnn with the repeat count (1 to 65535).

RSTnnn Reset Count (default is zero; no reset): An optional parameter used to specify the number of times to print an incremented field (on one or more forms) before resetting it to its starting value. This feature is useful if the data field consists of levels of subfields; e.g., job/phase/item number generation. The item number can be generated, reset, and then the phase incremented, etc. To use this option, enter RST and replace nnn with the reset count (1 to 65,535).

STARTDATA The starting value of alphanumeric data field to be incremented. The number of STARTDATA characters must be equal to or less than the number of characters in the STEPMASK parameter. If the number is less, the data will be right justified with leading spaces (leading spaces are not provided for bar code data). STARTDATA text must be enclosed within the standard delimiters (commonly quote marks). Refer to the Incrementing Alphanumeric Data for details.

Note: The type and quantity of characters allowed for bar code data depends on the type of bar code used. Refer to the applicable bar code Data Field instructions.

Execute Incremental Dynamic Data : EXECUTE

The standard Execute command format is used to execute non-incremental as well as incremental fixed data that is formatted under the Create Form Mode. The following Execute format is required for executing incremental dynamic data (alphanumeric or bar code). It should be noted that the command parameters differ from those required by the Execute command for non-incremental dynamic data. You cannot issue both incremental and non-incremental dynamic data parameters in the same Execute command.

The Execute Incremental Dynamic Data command is a modified version of the standard Execute command.

Execute Incremental Dynamic Data Command Syntax:

<SFCC>EXECUTE;FORM NAME[;PAGE n];**ICNTnnn[;IRSTnnn]**

Execute Incremental Dynamic Data Parameters:

ICNTnnn Incremental Form Count: The ICNT parameter specifies the number of forms to be produced with the incremental fields automatically updated. To specify the number of forms, enter ICNT and replace nnn with a numeric value (1 to 65,535).

IRSTnnn Incremental Reset Count (default is 1): An optional parameter used to specify the number of forms to produce before all incremental fields are reset to their starting values. The IRST parameter can be used to separate the total number of forms produced into multiple groups of identical copies. To use this option, enter IRST and replace nnn with a numeric value (1 to 65,535) to specify the reset count. In order for the reset to occur, the IRST value must be less than the ICNT value.

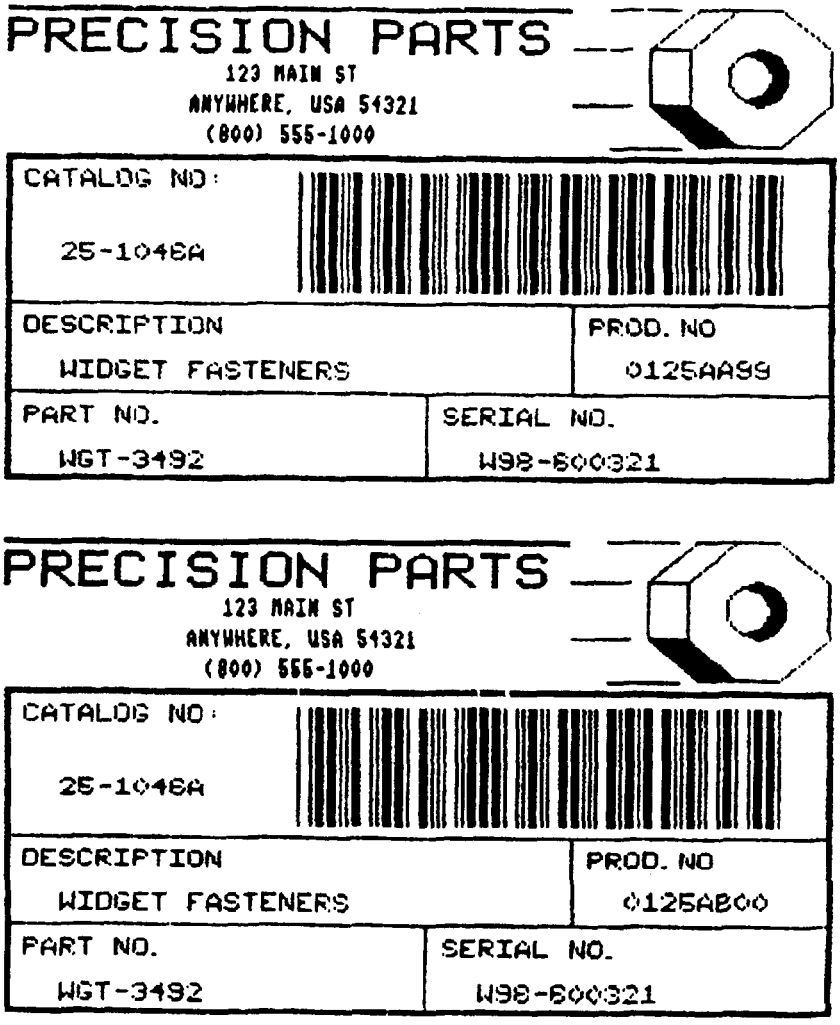
Example: Print a sequential production number on a pre-existing label. The shipping label used in the preceding examples (LABEL2) has been modified to include a box for production number. The modifications are shown in the program example that follows. A new label (LABEL3) must be created to illustrate the incremental field feature. This 8-digit field will consist of date (month/day) followed by a 4-digit incremental alphanumeric field. To achieve the final result, the labels are actually run twice; that is, blank labels are loaded, the LABEL2 program is processed, then the printed labels are reloaded and LABLEL3 is processed.

Executing Incremental Dynamic Data Programming Example:

```
~CREATE;LABEL2;216                    /(modifications to LABLEL2)
HORZ
...
BOX
...
HORZ
...
VERT
1;33;11;14                            /add down line for new box
1;25;14;17
...
ALPHA
...
1.6;3;0;0;"DESCRIPTION"
11.6;34;0;0;"PROD.NO."                /print box title
...
...
~EXECUTE;LABEL2;2                     /print two labels
...
~NORMAL
--- New Label ---
~CREATE;LABEL3;216                    /Create new label
ALPHA                                 /incremental alpha field
IAF1;8;13;36;0;0
STOP
END
~EXECUTE;LABEL3;2                     /print two labels
~IAF1;XXXX0001;"0125AA99"             /print production numbers

~NORMAL
```

Print Sample



Vertical Paper Motion

Paper movement is controlled either by the active printer emulation or by SmartGraphics. The emulation and the control panel are used during Normal Mode. Only SmartGraphics is used during Execute Form Mode. Error messages or a drifting top of form can be prevented by observing the following procedures:

1. To compensate for the Skip Over Perf setting, reduce the optional Forms Length parameter (FL) in the Create command by a corresponding amount. For example, if you want a 66 line form (11 inches at 6 lpi) with a Skip Over Perf value of 6 lines (1 inch), enter an FL parameter of 60 (60 lines equals 10 inches). This method of compensation will keep the top of form from drifting.
2. Use the vertical line spacing command (LPI) to select the desired line spacing.
3. Use the Top of Form key on the control panel only when in the Normal Mode. Using this key in other modes will cause the top of form to drift.

Paper must be loaded and adjusted to the desired top of form position before the Execute Form Mode is executed. SmartGraphics does not track paper movement initiated through the control panel. The use of control panel keys will cause the top of form maintained by SmartGraphics to differ from the top of form maintained by the printer.

To re-sychronize SmartGraphics and the printer's form settings, issue either a form feed or a NORMAL command to set SmartGraphics. Physically adjust the paper and press the control panel's top of form switch to set the print engine.

Fixed Record Length Utility Modes

Some software applications utilize "fixed record length" conventions where paper movement commands (carriage returns, line feeds, form feeds, etc.) are inserted to separate long data streams, and pad characters are inserted to extend short data streams.

If SmartGraphics is used with a such an application, it may be necessary to ignore these paper movement commands and pad characters. The SmartGraphics commands select Format and Ignore Sequence are provided for this purpose. You can also use the Quiet command to pass all data unchanged to the printer.

Select Format Command : SFON / SFOFF

Use this command as needed to ignore all host-generated paper movement commands (hex 00-0F) during the Normal, Create Form, or Execute Form Mode. The SFON and SFOFF commands cannot be used while Ignore Sequence is active. The command syntax is as follows:

SFON/SFOFF Command Syntax:

<SFCC>SFON or <SFCC>SFOFF

SFON/SFOFF Parameters:

<SFCC> Represents the Special Function Control Character.

SFON The Select Format On command.

SFOFF Exits Select Format.

Note: Certain paper movement commands can be used only while in the Select Format Mode. Use of these commands at any other time may result in a multiple error condition. Enter all commands in uppercase.

<SFCC>CR Sends a carriage return (hex 0D).

<SFCC>LF Sends a line feed (hex 0A).

<SFCC>FF Sends a form feed. (hex 0C).

Ignore Sequence Command : IGON / IGOFF

Use this command to ignore host-originated pad characters (refer to Fixed Record Length Utility Mode). This command can be entered during Normal, Create Form, or Execute Form Modes. Once IGON is issued, SmartGraphics will ignore all characters until it receives an IGOFF.

IGON/IGOFF Command Syntax:

<SFCC>IGON or <SFCC>IGOFF

IGON/IGOFF Parameters:

<SFCC>	Represents the Special Function Control Character.
IGON	Ignore Sequence On command
IGOFF	Exits Ignore Sequence.

CHAPTER 4. BAR CODES

A bar code is a graphic image that represents alphanumeric text characters. There are various types of bar code formats recognized as industry standards. The type/style used is determined by the application (e.g., publications, retail outlet, postal service, etc.)

Bar codes can be produced by issuing the applicable bar code command in Create Form Mode. Depending on the type, bar code parameters include optional darker print, horizontal or vertical orientation, magnification, variable height, and alphanumeric data field printing.

This chapter describes the following bar code types and commands:

Bar Code Type	**Command**
Code 3/9	C3/9
Code 128 - Subset B	C128B
Code 128 - Subset C	C128C
EAN 8	EAN8
EAN 13	EAN13
Interleaved 2 of 5	I-2/5
Universal Product Code - Version A	UPC-A
Universal Product Code - Version E	UPC-E
MSI	MSI
POSTNET	POSTNET

An overview of bar code types, terminology, and command conventions will be addressed first.

Bar Code Type Summary

This summary is presented in the following format:

Bar Code (command; data field length; code set)

Each code is followed by an abbreviated list of characteristics and options provided by that bar code command.

Code 3/9 (C3/9; Variable; Alphanumeric)

- Modulo-43 check digit field provided
- Vertical positioning of the bar code symbol
- Data can print above or below symbol
- OCR-A and OCR-B font selection for human-readable data
- Horizontal and vertical magnification

Code 128B (C128B; Variable; Alphanumeric)

- Modulo-103 check digit field provided
- Vertical positioning of the bar code symbol
- Data printing above or below symbol
- Automatic symbol compaction
- Horizontal and vertical magnification

Code 128C (C128C; Variable; Numeric)

- Modulo-103 check digit field provided
- Vertical positioning of the bar code symbol
- Data printing above or below symbol
- Horizontal and vertical magnification
- Nonnumeric or nonpaired numerics replaced with Code 128B symbols

EAN 8 (EAN8; Fixed 7 digits; Numeric)

- Modulo-10 check digit field provided
- No magnification option is allowed
- Automatic printing of data in OCR-B
- Height option from 0.4 to 9.9 inches
- Suppress printable data field option
- Optional 2-5 digit add-on data field

EAN 13 (EAN13; Fixed 12 digits, Numeric)

- Modulo-10 check digit field provide
- No magnification option is allowed
- Automatic printing of data in OCR-B
- Height option from 0.4 to 9.9 inches
- Suppress printable data field option
- Optional 2-5 digit add-on data field
- Interleaved 2/5 (I-2/5; Variable, Numeric)
- Modulo-10 check digit field provided
- Vertical positioning of the bar code symbol
- Data printed above or below symbol
- Horizontal and vertical magnification
- OCR-A and OCR-B font selection for human-readable data field

UPC-A (UPC-A; Fixed 11 digits, Numeric)

UPC-E (UPC-E; Fixed 11 digits, Numeric)

- Modulo-10 check digit field provided
- Vertical positioning of the bar code symbol
- Automatic printing of data in OCR-B
- No magnification allowed
- Height option from 0.4 to 9.9 inches
- Suppress printable data field option
- Optional 2-5 digit add-on data field

MSI

- Modulo 10, 11, or combination check digit provided
- Vertical positioning of the bar code symbol
- Data printed above or below symbol
- Height option from 0.4 to 9.9 inches
- Variable magnification option

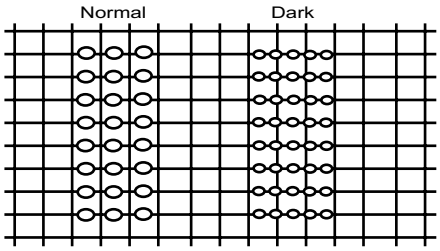
POSTNET

Specific POSTNET bar code requirements can be obtained from Publication 25: “A Guide to Business Mail Preparation” published by the U.S. Postal Service.

Bar Code Structure

A bar code composed of various elements or parts. Each bar code is unique, in that it has its own set of specifications regarding each element.

As an illustration of a typical bar code structure, a Code 3/9 Bar Code diagram is shown below in both horizontal and vertical orientation.



Bar Code Terminology

A particular terminology is used to describe the structure of bar code symbols with regard to their various parts or elements as shown in the preceding diagram. Some of the elements are:

Quiet Zone
Start/Stop Code
Data Field
Readable Data
Check Digit

Quiet Zone

Quiet zones are blank, nonprint, areas required at both ends of a bar code. These nonprint zones ensure accurate reading of the start/stop codes and keep nearby symbols from overlapping. The quiet zone is to be a minimum dimension as specified by the bar code type. Be sure your forms design provides adequate space for the quiet zones.

Start/Stop Code

The Start/Stop Code (called “framing bars” in POSTNET codes) is a unique character automatically created by SmartGraphics. It specifies the leading and trailing end of the bar code to permit bidirectional scanning. Some bar code types require a Center Code as well.

Data Field

The area reserved for the bars that represent the alphanumeric text characters. A bar code symbol is a graphic consisting of wide and narrow bars and spaces that represent characters. The number of bars and the bar ratio (narrow to wide, dark to light) required for one character depends on the bar code type.

Readable Data

Some bar code types allow an optional human-readable data field for bar code interpretation. If allowed, the print location with respect to the bar code (above or below, below only) will be specified with the individual command syntax.

Check Digit

The check digit is a value used to verify scanning accuracy. Some bar code commands provide an option for automatic check digit generation and insertion. Otherwise, the check digit is inserted automatically as part of the command function. The method used to calculate the check digit depends on the bar code type. When reading the bar code, a scanner generates its own check digit which it compares against the embedded check digit.

Common Bar Code Parameters

Bar code command sequences contain a number of parameters, some of which are required and some of which are optional. Some parameters are:

BARCODE, VSCAN, Hn, BFn;L, DARK, SR, SC, D, STOP

Parameters are common to the majority of the bar code commands. So there is no need for repeated explanation with each command syntax. These parameters are given general coverage here so the user can focus on the details unique to the applicable bar code command.

Common Bar Code Command Syntax:

BARCODE<LF>
(type)[;VSCAN][(magnify)][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)(data field contents)(D)]<LF>
[(readable data and font options)]<LF>
STOP<LF>

Common Bar Code Parameters (exceptions are noted):

BARCODE — The Bar Code Command: This is the initial command that precedes any bar code command sequence. It is always entered as shown, in upper case with no space between BAR and CODE.

VSCAN — Vertical Orientation (optional): Bar codes are normally printed in a horizontal orientation. VSCAN is an optional parameter used to position the bar code vertically. The option is invoked by entering VSCAN in the command sequence. The VSCAN option is not allowed for POSTNET bar codes.

Hn — Height (default is 0.9 inch): This is an optional parameter used to alter the height of the bar code symbol. To use this option, enter H and a numeric value (4 to 99). Adjustments are made in tenth-inch increments from 0.4 to 9.9 inches. An entry of 25, for example, means the vertical height of the bar code will be expanded 2.5 inches. The expansion includes the upper and lower 0.1 inch guard bands and any human-readable data. The Hn option is not valid for POSTNET bar codes.

Common Bar Code Parameters (Continued):

BFn;L

Bar Code Form Location and Length: This is an optional parameter provided by all bar code types. It is used to identify form location and length of a dynamic bar code data field (similar to the Alpha AFn;L parameter). If used, the actual bar code data field cannot be entered during the Create Form Mode. Do not use the DATA FIELD parameter. Dynamic bar code data is entered during the Execute Form Mode, so it can be changed without redefining or recreating the bar code. Refer to Execute Dynamic Bar Code Data.

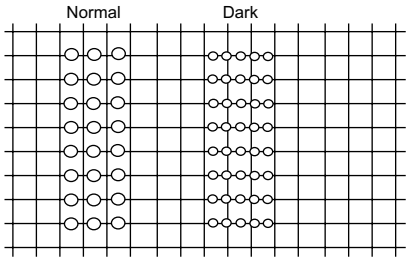
To use the BFn;L option, replace n with a number (1 to 255) to specify the bar code location on the form. The SR and SC parameters will specify the precise starting row and column for field n. For L (length), enter the total number of characters to allow for the data field. The number of characters of dynamically entered text must be equal to or less than the assigned L value. Refer to Execute Dynamic Alphanumeric Data. The DATA FIELD parameter description specifies the valid characters available for the applicable bar code type.

DARK

Dark Plot Mode: All bar codes except POSTNET provide a Dark Plot Mode option used to make the symbol darker. The darker appearance is achieved by adding additional dots horizontally to the wide bars. Use of the Dark Plot Mode improves the Print Contrast Ratio (PCR), an important factor for bar code readability. The higher the light and dark contrast is between bars and spaces, the more likely the bar code is to be read with accuracy by a scanning device.

Ribbon life is extended under the dark mode, because a greater number of readable symbols can be produced by the same ribbon. Due to the printing of extra dots, print speed will be decreased.

The overall width of the wide bars is not increased by the extra dots. Two extra columns of dots are actually printed within the normal columns to fill in the holes left between the rounded dots. The following illustration of a grid



shows two bars, three dot columns wide. The one on the left represents normal print; the one on the right represents the same bar printed under the Dark Plot Mode.

SR

Starting Row: The SR value specifies the Starting Row Position data position for the bar code print. Replace SR with a numeric value (1 to one less than the length of the form). Character row or dot row is determined by the Scale command or the CP.DP format. All bar code commands require an SR value.

Common Bar Code Parameters (Continued):

SC — Starting Column: The SC value specifies the Starting Column Position data position for the bar code print. Replace SC with a numeric value (1 to one less than the width of the form). Character column or dot column is determined by the Scale command or the CP.DP format. All bar code commands require an SC value.

D — Delimiter: Used to denote the start and finish of the data field. Use any printable character other than a /, the SFCC, or a character used within the string itself. Quotation marks (“) are most commonly used to denote both ends of an alphanumeric string. The delimiter is not printed. All bar code data fields require delimiters.

STOP — End Bar Code Command: Enter STOP to terminate any bar code command sequence. The printer will remain in the Create Form Mode. Omission of the STOP parameter will result in an error message.

Code 3/9 Bar Code Structure

Quiet Zone	0.25 inch minimum.
Data Field	Alphanumeric (variable length), marked by Start/Stop Code. Each wide or narrow bar is one element; one character is made up of 9 elements. The number of bars per character is 5 dark bars and 4 light bars for a total of 9 bars, where 3 of the bars are wide and the other 6 bars are narrow. Both light and dark bars are coded to define the character. Additionally, this style has an Intercharacter Gap.
Readable Data	Optional. Can be printed above or below bar code symbol.
Check Digit	Optional. Modulo-43.

Code 3/9 Bar Code Command Syntax:

BARCODE<LF>
C3/9[CD][;VSCAN]**[;MAG]**[;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

Code 3/9 Bar Code Parameters:

(Refer to Common Bar Code Parameters for entries not covered below.)

C3/9[CD] Bar Code type and optional check digit. Enter C3/9 followed by CD, to generate and include the optional modulo-43 check digit with the bar code symbol.

MAG Magnify (default is X1): This optional parameter is used to expand the bar code symbol; that is, increase the character density to facilitate Scanning scanning. Replace MAG with values of X1A, X1B, X2, X3, or X4 to expand the bar code vertically or horizontally as described in the table below.

Mag	Horizontal (60 dpi)			Vertical (72 dpi)		
	A.N.W.	Ratio	cpi	A.N.W.	Ratio	cpi
X1	16.7	3:1	3.75	20.7	2.3:1	3.45
X1A	16.7	2:1	4.6	13.6	3:1	4.5
X1B	37.5	2.5:1	4.2	20.7	2.8:1	2.4
X2	37.5	2.3:1	1.9	27.7	2.8:1	2.4
X3	54.2	2.5:1	1.3	41.4	2.7:1	1.6
X4	70.8	2.4:1	1.0	55.2	2.8:1	1.3
A.N.W. is Average Narrow Width (in millimeters); cpi indicates density.						

Code 3/9 Bar Code Parameters (Continued):

DATA FIELD Variable length, usually limited to 32 characters to reduce read errors. Replace DATA FIELD with the desired bar code characters. A null data field (no characters) is allowed. Other than the SFCC, enter any of the characters

Character	Hex	Character	Hex
0	30	M	4D
1	31	N	4E
2	32	O	4F
3	33	P	50
4	34	Q	51
5	35	R	52
6	36	S	53
7	37	T	54
8	38	U	55
9	39	V	56
A	41	W	57
B	42	X	58
C	43	Y	59
D	44	Z	5A
E	45	Space	20
F	46	$	24
G	47	%	25
H	48	+	2B
I	49	-	2D
J	4A	.	2E
K	4B	/	2F
L	4C		

shown in the table below. Do not use the DATA FIELD parameter if bar code data will be dynamically entered (refer to BFn;L parameter).

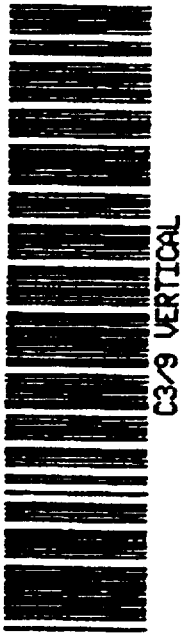
Note: OCR-A and OCR-B fonts are not permitted with vertical bar codes. If vertical and PDF options are selected, the readable data will be printed in normal 10 cpi regardless of the font specification.

Code 3/9 Bar Code Programming Example:

```
~CREATE;BC_C39          /create form for bar code
BARCODE                 /Bar Code command
C3/9;DARK;20;30         /print dark at SR 20, SC 30
“C3/9 EXAMPLE”          /data field
PDF                     /print human-readable data
STOP                    /terminate Bar Code command
BARCODE                 /second Bar Code command
C3/9;VSCAN;H10;27;30    /vertical; height 10; SR 27; SC 30
“C3/9 VERTICAL”         /data field
PDF                     /print human-readable data
STOP                    /terminate Bar Code command
END                     /terminate Create Mode
~EXECUTE;BC_C39         /print bar code

~NORMAL                 /return to the Normal Mode
```

Print Sample



Code 128B Bar Code Structure

Quiet Zone	0.25 inch minimum.
Data Field	Alphanumeric (variable length), marked by Start/Stop Code. This bar code symbol provides an extensive character set (96 ASCII characters, plus 7 control characters). A series of bars and spaces vary in width from 1 to 4 modules. A character consists of 6 bars: 3 dark bars and 3 light bars that total 11 modules. Exception: CODE 128 STOP character bar pattern contains 13 modules yielding 4 dark bars and 3 light bars for a total of 7 bars.
Human Readable Data	Optional. Can be printed above or below bar code symbol.
Check Digit	The checksum is automatically calculated and inserted into the symbol immediately preceding the STOP character. The check character is a modulus 103 checksum that is calculated by summing the start code value plus the products of each character position (most significant character position=1) and the character value of that position. The sum of the start code value and the products is then divided by 103. The remainder of the answer is the check digit.

Code 128B Bar Code Command Syntax:

BARCODE<LF>
C128B[;VSCAN]**[;MAG]**[;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;LOC]]<LF>
STOP<LF>

Code 128B Bar Code Parameters:

Refer to Common Bar Code Parameters for entries not covered below.

C128C Bar code type; enter C128C.

MAG Magnify (default is X1): This optional parameter is used to expand the bar code symbol; that is, increase the character density to facilitate scanning. Replace MAG with values of X1.5, X2, X3, or X4 to expand the bar code vertically or horizontally as described in the table below.

Mag	Horizontal (60 dpi)			Vertical (72 dpi)		
	A.N.W.	Ratio	cpi	A.N.W.	Ratio	cpi
X1	16.7	4:3:2:1	5.4	13.8	4:3:2:1	6.5
X1.5	25.0	4:3:2:1	4.1	20.7	4:3:2:1	4.3
X2	33.0	4:3:2:1	2.7	27.6	4:3:2:1	3.3
X3	50.0	4:3:2:1	1.8	41.4	4:3:2:1	2.2
X4	66.7	4:3:2:1	1.4	55.2	4:3:2:1	1.6
A.N.W. is Average Narrow Width (in millimeters); cpi indicates density.						

Code 128B Bar Code Parameters (Continued):

DATA FIELD Variable length, usually limited to 32 characters to reduce read errors. Replace DATA FIELD with the desired bar code characters. A null data field (no characters) is allowed. Other than the SFCC, any characters listed in the following table can be entered. Do not use the DATA FIELD parameter if bar code data will be dynamically entered (refer to BFn;L parameter).

Note: SmartGraphics inserts a "CODE C" designator at the start of a string of 6 or more contiguous numerics. Digit pairs are then packed and output as single bar code characters. Broken strings (nonnumerics or an unpaired numerics) identified by an inserted "CODE B" are represented by normal C128B symbols.

Character	Hex	Character	Hex	Character	Hex	Character	Hex
SP	20	:	3A	T	54	n	6E
!	21	;	3B	U	55	o	6F
"	22	<	3C	V	56	p	70
#	23	=	3D	W	57	q	71
$	24	>	3E	X	58	r	72
%	25	?	3F	Y	59	s	73
&	26	@	40	Z	5A	t	74
'	27	A	41	[	5B	u	75
(	28	B	42	\	5C	v	76
)	29	C	43	]	5D	w	77
*	2A	D	44	^	5E	x	78
+	2B	E	45	_	5F	y	79
,	2C	F	46	`	60	z	7A
-	2D	G	47	a	61	{	7B
.	2E	H	48	b	62	|	7C
/	2F	I	49	c	63	}	7D
0	30	J	4A	d	64	~	7E
1	31	K	4B	e	65	DEL	7F
2	32	L	4C	f	66	FNC 3	23 *1
3	33	M	4D	g	67	FNC 2	22 *1
4	34	N	4E	h	68	SHIFT	28 *1
5	35	O	4F	i	69	CODE C	27 *1
6	36	P	50	j	6A	FUNC 4	24 *1
7	37	Q	51	k	6B	CODE A	25 *1
8	38	R	52	l	6C	FNC 1	21 *1
9	39	S	53	m	6D	START B	(NA)
						STOP	(NA)

Note: The control character set is activated and deactivated by SO (Shift Out, hex 0E) and SI (Shift In, hex 0F). Use SO to identify subsequent characters as control function characters. Use SI to return to standard character set.

PDF Printable Data Field (human-readable text): This optional parameter is not permitted if a null DATA FIELD has been specified.

Code 128B Bar Code Parameters (Continued):

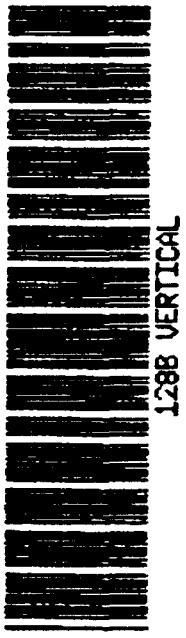
LOC Location (default is B or Below): An optional parameter used to place the PDF (Printable Data Field) above (A) or below (B) the bar code symbol. Enter A if you wish to locate the PDF above the bar code. The height of the bars will be reduced 0.1 inch to allow for printing the 0.1 inch high PDF.

Code 128B Bar Code Programming Example:

```
~CREATE;BC_128B          /create form for bar code
BARCODE                  /Bar Code command
128B;DARK;20;30          /print dark at SR 20, SC 30
“128B EXAMPLE”           /data field
PDF                      /print human-readable data
STOP                     /terminate Bar Code command
BARCODE                  /second Bar Code command
128B;VSCAN;H10;27;30     /vertical; height 10; SR 27; SC 30
“128B VERTICAL”          /data field
PDF                      /print human-readable data
STOP                     /terminate Bar Code command
END                      /terminate Create Mode
~EXECUTE;BC_128B         /print bar code

~NORMAL                  /return to the Normal Mode
```

Print Sample



Code 128C Bar Code Structure

Quiet Zone	0.25 inch minimum.
Data Field	Numeric (variable length), marked by Start/Stop Code. This bar code symbol provides 100 pairs of numeric digits (00 through 99) and 3 control characters. A series of bars and spaces vary in width from 1 to 4 modules. A character consists of 6 bars: 3 dark bars and 3 light bars that total 11 modules. Exception: CODE 128 STOP character bar pattern contains 13 modules yielding 4 dark bars and 3 light bars for a total of 7 bars.
Readable Data	Optional. Can be printed above or below bar code symbol.
Check Digit	The checksum is automatically calculated and inserted into the symbol immediately preceding the STOP character. The check character is a modulus 103 checksum that is calculated by summing the start code value plus the products of each character position (most significant character position=1) and the character value of that position. The sum of the start code value and the products is then divided by 103. The remainder of the answer is the check digit.

Code 128C Bar Code Command Syntax:

BARCODE<LF>
C128C[;VSCAN]**[;MAG]**[;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;LOC]]<LF>
STOP<LF>

Code 128C Bar Code Parameters:

Refer to Common Bar Code Parameters for entries not covered below.

C128C Bar code type; enter C128C.

MAG Magnify (default is X1): This optional parameter is used to expand the bar code symbol; that is, increase the character density to facilitate scanning. Replace MAG with values of X1.5, X2, X3, or X4 to expand the bar code vertically or horizontally as described in the table below.

Mag	Horizontal (60 dpi)			Vertical (72 dpi)		
	A.N.W.	Ratio	cpi	A.N.W.	Ratio	cpi
X1	16.7	4:3:2:1	10.9	13.8	4:3:2:1	13.2
X1.5	25.0	4:3:2:1	8.2	20.7	4:3:2:1	8.8
X2	33.0	4:3:2:1	5.4	27.6	4:3:2:1	6.6
X3	50.0	4:3:2:1	3.6	41.4	4:3:2:1	4.4
X4	66.7	4:3:2:1	2.7	55.2	4:3:2:1	3.3
A.N.W. is Average Narrow Width (in millimeters); cpi indicates density.						

Code 128C Parameters (Continued):

DATA FIELD Variable length, usually limited to 32 characters to reduce read errors. Replace DATA FIELD with the desired bar code characters. A null data field (no characters) is allowed. Other than the SFCC, any character listed in the following table can be entered. Do not use the DATA FIELD parameter if bar code data will be dynamically entered (refer to BFn;L parameter).

Note: SmartGraphics inserts a "CODE C" designator at the start of a string of 6 or more contiguous numerics. Digit pairs are then packed and output as single bar code characters. Broken strings (nonnumerics or an unpaired numerics), identified by an inserted "CODE B", are represented by normal C128B symbols.

Character	Hex		Character	Hex		Character	Hex		Character	Hex	
00	30	30	27	32	37	54	35	34	81	38	31
01	30	31	28	32	38	55	35	35	82	38	32
02	30	32	29	32	39	56	35	36	83	38	33
03	30	33	30	33	30	57	35	37	84	38	34
04	30	34	31	33	31	58	35	38	85	38	35
05	30	35	32	33	32	59	35	39	86	38	36
06	30	36	33	33	33	60	36	30	87	38	37
07	30	37	34	33	34	61	36	31	88	38	38
08	30	38	35	33	35	62	36	32	89	38	39
09	30	39	36	33	36	63	36	33	90	39	30
10	31	30	37	33	37	64	36	34	91	39	31
11	31	31	38	33	38	65	36	35	92	39	32
12	31	32	39	33	39	66	36	36	93	39	33
13	31	33	40	34	30	67	36	37	94	39	34
14	31	34	41	34	31	68	36	38	95	39	35
15	31	35	42	34	32	69	36	39	96	39	36
16	31	36	43	34	33	70	37	30	97	39	37
17	31	37	44	34	34	71	37	31	98	39	38
18	31	38	45	34	35	72	37	32	99	39	39
19	31	39	46	34	36	73	37	33	CODE B	26 *1	
20	32	30	47	34	37	74	37	34	CODE A	25 *1	
21	32	31	48	34	38	75	37	35	FNC 1	21 *1	
22	32	32	49	34	39	76	37	36	START C	(NA)	
23	32	33	50	35	30	77	37	37	STOP	(NA)	
24	32	34	51	35	31	78	37	38			
25	32	35	52	35	32	79	37	39			
26	32	36	53	35	33	80	38	30			

Note: The control character set is activated and deactivated by SO (Shift Out, hex 0E) and SI (Shift In, hex 0F). Use SO to identify subsequent characters as control function characters. Use SI to return to standard character set.

PDF Printable Data Field (human-readable text): This optional parameter is not permitted if a null DATA FIELD has been specified.

Code 128C Parameters (Continued):

LOC	Location (default is B or Below): A optional parameter used to place the PDF (Printable Data Field) above (A) or below (B) the bar code symbol. Enter A if you wish to locate the PDF above the bar code. The height of the bars will be reduced 0.1 inch to allow for printing the 0.1 inch high PDF.

Code 128C Bar Code Programming Example:

```
~CREATE;BC_128C                 /create form for bar code
BARCODE                         /Bar Code command
128C;DARK;20;30                 /print dark at SR 20, SC 30
“1281281280”                    /data field
PDF                             /print human-readable data
STOP                            /terminate Bar Code command
BARCODE                         /second Bar Code command
128C;VSCAN;H10;27;30            /vertical; height 10; SR 27; SC 30
“1281281280”                    /data field
PDF                             /print human-readable data
STOP                            /terminate Bar Code command
END                             /terminate Create Mode
~EXECUTE;BC_128C                /print bar code

~NORMAL                         /return to the Normal Mode
```

Print Sample

EAN 8 Bar Code Structure

Quiet Zone	0.25 inch minimum.
Data Field	Numeric (fixed 7 digits), marked by Start/Center/Stop Codes. This bar code symbol provides a limited character set of numerics 0-9 and Special Characters Start, Center, and Stop. A series of bars and spaces vary in width from 1 to 4 modules. A character consists of 4 bars: 2 dark bars and 2 light bars that total 7 modules. Exceptions: The Start/Stop code bar patterns have 2 dark bars and 1 light bar for a total of 3 bars; the Center code bar pattern has 2 dark bars and 3 light bars for a total of 5 bars.
Add-On Data	Optional. Add-On data (2-5 digits) can be placed at the end of the bar code. The Add-On code identifies either a 2-digit periodical issue number or 5-digit price data. Enter "+2" or "+5" as the optional parameter. A 9-module separation will exist between the first bar code of the Add-On data and the last bar of the EAN symbol and a left guard pattern. There is no center or right guard pattern.
Readable	Data Optional. Can be printed below the bar code symbol.
Check Digit	Modulo-10 check digit automatically inserted.

EAN8 Bar Code Command Syntax:

BARCODE<LF>
EAN8[+n][;VSCAN][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;FONT]]<LF>
STOP<LF>

EAN8 Bar Code Parameters:

Refer to Common Bar Code Parameters for entries not covered below.

EAN13	Bar code type; enter EAN13.
+n	Optional Add-On Data Field: Enter "+2" or "+5" to designate an additional 2- or 5-digit data field.
DATA FIELD	Enter 12 digits (no more or no less) for the bar code data, plus the 2- or 5-digit Add-On data, as indicated by the +n parameter. The first character becomes the number system character. The characters available for the data field are limited to those listed in the table below.

Character	Hex	Character	Hex
0	30	5	35
1	31	6	36
2	32	7	37
3	33	8	38
4	34	9	39

Code EAN8 Parameters (Continued):

The following table shows the EAN8 character bar and space requirements:

Bar/Space Width		Horizontal Orientation Dots/Spaces on 1/60 Centers	Vertical Orientation Dots/Spaces 1/72 Centers
1	module	1	1
2	module	2	2
3	module	3	3
4	module	4	4

PDF Printable Data Field (human-readable text): This optional parameter is not permitted if a null DATA FIELD has been specified. If desired, enter PDF and the text will be printed below the bar code symbol unless suppressed by the FONT S parameter.

FONT Default is N (Normal ASCII 10 cpi). An optional parameter used to specify the PDF (Printable Data Field) font. Besides the default, you can enter O to specify OCR-A 10 cpi, or X to specify OCR-B 10 cpi. You can suppress the PDF and trailing lower portions of the EAN bar code by entering S.

Note: OCR-A and OCR-B fonts are not permitted with vertical bar codes. If vertical and PDF options are selected, the readable data will be printed in normal 10 cpi regardless of the font specification.

EAN 8 Bar Code Programming Example:

```
~CREATE;BC_EAN8          /create form for bar code
BARCODE                  /Bar Code command
EAN8;DARK;20;30          /print dark at SR 20, SC 30
“1234567”                /data field
PDF                      /print human-readable data
STOP                     /terminate Bar Code command
BARCODE                  /second Bar Code command
EAN8;VSCAN;H10;30;30"123 /vertical; height 10; SR 30; SC 30
4567"                    /data field
PDF                      /print human-readable data
STOP                     /terminate Bar Code command
END                      /terminate Create Mode
~EXECUTE;BC_EAN8         /print bar code

~NORMAL                  /return to the Normal Mode
```

Print Sample

EAN 13 Bar Code Structure

Quiet Zone	11-module quiet zone automatically provided; user's form must provide space for a minimum of a 7-module right quiet zone. The number system character is printed in the left quiet zone.
Number System Character	This number is taken from the first character in the data field. It is used to apply a code to a class or type of item.
Data Field	Numeric (fixed 12 digits), marked by Start/Center/Stop Codes. This bar code symbol provides a limited character set of numerics 0-9 and Special Characters Start, Center, and Stop. A series of bars and spaces vary in width from 1 to 4 modules (the smallest increment that can represent data). Each character consists of 4 bars: 2 dark bars and 2 light bars that total 7 modules. Exceptions: The Start/Stop code bar patterns have 2 dark bars and 1 light bar for a total of 3 bars; the Center code bar pattern has 2 dark bars and 3 light bars for a total of 5 bars.
Add-On Data	Optional. Add-On data (2-5 digits) can be placed at the end of the bar code. The Add-On code identifies either a 2-digit periodical issue number or 5-digit price data. Enter "+2" or "+5" as the optional parameter. A 9-module separation will exist between the first bar code of the Add-On data and the last bar of the EAN symbol and a left guard pattern. There is no center or right guard pattern.
Readable Data	Optional. Can be printed below the bar code symbol.
Check Digit	Modulo-10 check digit automatically inserted.

EAN13 Bar Code Command Syntax:

BARCODE<LF>
EAN13[+n][;VSCAN][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;FONT]]<LF>
STOP<LF>

EAN 13 Bar Code Parameters:

Refer to Common Bar Code Parameters for entries not covered below.

EAN13 Bar code type; enter EAN13.

+n Optional Add-On Data Field: Enter “+2” or ”+5" to designate an additional 2- or 5-digit data field.

DATA FIELD Enter 12 digits (no more, no less) for the bar code data, plus the 2- or 5-digit Add-On data, as indicated by the +n parameter. The first character becomes the number system character. The characters available for the data field are limited to those listed in the table below.

Character	Hex	Character	Hex
0	30	5	35
1	31	6	36
2	32	7	37
3	33	8	38
4	34	9	39

Note: Refer to the Bar Code Add-On Data (UPC and EAN styles), for Add-On Data specifications.

The number system character value dictates the encoding format (A or B) of the left side of the data field. The right side and check digit are always encoded in format C. Right and left refer to upper and lower in a vertically orientated bar code. No bar code character is created for the number system character, which is derived from the left side data field encoding. The table below defines the left side data field format based on the number system character.

Number System Character Value	Format for Left Side Data Field Positions					
	12	11	10	9	8	7
0	A	A	A	A	A	A
1	A	A	B	A	B	B
2	A	A	B	B	A	B
3	A	A	B	B	B	A
4	A	B	A	A	B	B
5	A	B	B	A	A	B
6	A	B	B	B	A	A
7	A	B	A	B	B	B
8	A	B	A	B	B	A
9	A	B	B	A	B	A

Note: Refer to the Bar Code Add-On Data, for additional details.

EAN 13 Bar Code Parameters (Continued):

The following table shows the EAN13 character bar and space requirements:

Bar/Space Width		Horizontal Orientation Dots/Spaces on 1/60 Centers	Vertical Orientation Dots/Spaces 1/72 Centers
1	module	1	1
2	module	2	2
3	module	3	3
4	module	4	4

PDF Printable Data Field (human-readable text): This optional parameter is not permitted if a null DATA FIELD has been specified. If desired, enter PDF and the text will be printed below the bar code symbol unless suppressed by the FONT S parameter.

FONT Default is N (Normal ASCII 10 cpi). An optional parameter used to specify the PDF (Printable Data Field) font. Besides the default, you can enter O to specify OCR-A 10 cpi or X to specify OCR-B 10 cpi. You can suppress the PDF and trailing lower portions of the EAN bar code by entering S.

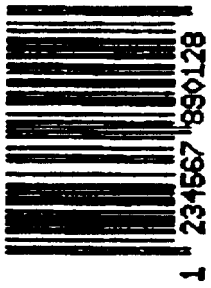
Note: OCR-A and OCR-B fonts are not permitted with vertical bar codes. If vertical and PDF options are selected, the readable data will be printed in normal 10 cpi regardless of the font specification.

EAN 13 Bar Code Programming Example:

```
~CREATE;BC_EAN13          /create form for bar code
BARCODE                   /Bar Code command
EAN13;DARK;20;30          /print dark at SR 20, SC 30
“123456789012”            /data field
PDF                       /print human-readable data
STOP                      /terminate Bar Code command
BARCODE                   /second Bar Code command
EAN13;VSCAN;H10;30;30     /vertical; height 10; SR 30; SC 30
“123456789012”            /data field
PDF                       /print human-readable data
STOP                      /terminate Bar Code command
END                       /terminate Create Mode
~EXECUTE;BC_EAN13         /print bar code

~NORMAL                   /return to the Normal Mode
```

Print Sample



Interleaved 2/5 Bar Code Structure

Quiet Zone	0.25 inch minimum.
Data Field	Numeric (variable length), marked by Start/Stop Code. Bars exist in 10-bar “units” that represent two characters: the first is coded by 5 dark bars, the second coded by 5 light bars. Exception: The Start character bar pattern has 2 dark bars and 2 light bars for a total of 4 bars; the Stop character bar pattern has 2 dark bars and 1 light bar for a total of 3 bars.
Readable Data	Optional. Can be printed above or below bar code symbol.
Check Digit	Optional. Modulo-10.

Interleaved 2/5 Command Syntax:

BARCODE<LF>
I-2/5[CD][;VSCAN]**[;MAG]**[;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

Interleaved 2/5 Bar Code Parameters:

Refer to Common Bar Code Parameters for entries not covered below.

I-2/5[CD] Bar code type and optional check digit. Enter I-2/5 followed by CD, if you want to generate and include the optional modulo-10 check digit with the bar code symbol.

MAG Magnify (default is X1): This optional parameter is used to expand the bar code symbol; that is, increase the character density to facilitate scanning. Replace MAG with values of X1A, X1B, X2, X2A, X3, or X4 to expand the bar code vertically or horizontally as described in the table below.

Mag	Horizontal (60 dpi)			Vertical (72 dpi)		
	A.N.W.	Ratio	cpi	A.N.W.	Ratio	cpi
X1	16.7	3:1	6.7	20.7	2.3:1	6.4
X1A	16.7	2.6:1	5.7	13.8	3:1	8.0
X1B	16.7	2:1	8.5	20.7	3:1	6.0
X2	37.5	2.3:1	3.5	27.7	2.8:1	4.2
X2A	33.5	2:1	4.3	27.7	2:1	5.2
X3	54.2	2.5:1	2.3	41.4	2.7:1	2.9
X4	70.8	2.4:1	1.8	55.2	2.8:1	2.1
A.N.W. is Average Narrow Width (in millimeters); cpi indicates density.						

DATA FIELD Variable length (usually limited to 32 characters to reduce read errors). Replace DATA FIELD with the desired bar code characters. A null data field (no characters) is allowed. Interleaving requires an even number of characters; therefore, a leading zero will automatically be added to a field containing odd number of characters. Other than the SFCC, you can enter any of the characters shown in the following table. Do not use the DATA FIELD parameter if bar code data will be dynamically entered (refer to BFn;L parameter).

Character	Hex	Character	Hex
0	30	5	35
1	31	6	36
2	32	7	37
3	33	8	38
4	34	9	39

PDF Printable Data Field (human-readable text): This optional parameter is not permitted if a null DATA FIELD has been specified.

LOC Location (default is B or Below): An optional parameter used to place the PDF (Printable Data Field) above (A) or below (B) the bar code symbol. Enter A if you want to locate the PDF above the bar code. The height of the bars will be reduced 0.1 inch to allow for printing the 0.1 inch high PDF.

Interleaved 2/5 Bar Code Parameters (Continued):

FONT Default is N (Normal ASCII 10 cpi). An optional parameter used to specify the PDF (Printable Data Field) font. Besides the default, you can enter O to specify OCR-A 10 cpi, or X to specify OCR-B 10 cpi.

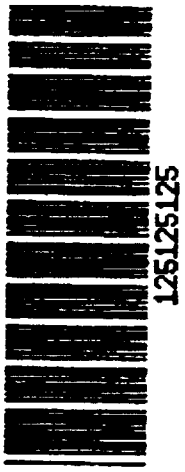
Note: OCR-A and OCR-B fonts are not permitted with vertical bar codes. If vertical and PDF options are selected, the readable data will be printed in normal 10 cpi regardless of the font specification.

Interleaved 2/5 Bar Code Programming Example:

```
~CREATE;BC_I25          /create form for bar code
BARCODE                 /Bar Code command
I25;DARK;20;30          /print dark at SR 20, SC 30
“125125125”             /data field
PDF                     /print human-readable data
STOP                    /terminate Bar Code command
BARCODE                 /second Bar Code command
I25;VSCAN;H10;26;30     /vertical; height 10; SR 26; SC 30
“125125125”             /data field
PDF                     /print human-readable data
STOP                    /terminate Bar Code command
END                     /terminate Create Mode
~EXECUTE;BC_I25         /print bar code

~NORMAL                 /return to the Normal Mode
```

Print Sample



UPC-A Bar Code Structure

Quiet Zone	11-module quiet zone automatically provided. The user's form must provide space for a minimum of a 7-module right quiet zone. The number system character is printed in the left quiet zone.
Number System Character	This number is taken from the first character in the data field. It is used to apply a code to a class or type of item.
Data Field	Numeric (fixed 11 digits), marked by Start/Center/Stop Codes. This bar code symbol provides a limited character set of numerics 0-9 and Special Characters Start, Center and Stop. A series of bars and spaces vary in width from 1 to 4 modules (the smallest increment that can represent data). Each character consists of 4 bars: 2 dark bars and 2 light bars that total 7 modules. Exceptions: The Start/Stop code bar patterns have 2 dark bars and 1 light bar for a total of 3 bars; the Center code bar pattern has 2 dark bars and 3 light bars for a total of 5 bars.
Add-On Data	Optional. Add-On data (2-5 digits) can be placed at the end of the bar code. The Add-On code identifies either a 2-digit periodical issue number or 5-digit price data. Enter "+2" or "+5" as the optional parameter. A 9-module separation will exist between the first bar code of the Add-On data and the last bar of the UPC symbol and a left guard pattern. There is no center or right guard pattern.
Readable	Data Optional. Can be printed below the bar code symbol.
Check Digit	Modulo-10 check digit automatically inserted. Check digit formula includes the number system character.

UPC-A Bar Code Command Syntax:

BARCODE<LF>
UPC-A[+n][;VSCAN][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;FONT]]<LF>
STOP<LF>

UPC-A Bar Code Parameters:

Refer to Common Bar Code Parameters for entries not covered below.

UPC-A	Bar code type; enter UPC-A.
+n	Optional Add-On Data Field: Enter "+2" or "+5" to designate an additional 2- or 5-digit data field.

UPC-A Bar Code Parameters (Continued):

DATA FIELD Enter 11 digits (no more, no less) for the bar code data, plus the 2- or 5-digit Add-On data, as indicated by the +n parameter. The first character is the number system character. The characters available for the data field are limited to those listed in the following table. Refer to the Bar Code Add-On (UPC and EAN styles) in this chapter for Add-On data specifications.

Character	Hex	Character	Hex
0	30	5	35
1	31	6	36
2	32	7	37
3	33	8	38
4	34	9	39

PDF Printable Data Field (human-readable text). This optional parameter is not permitted if a null DATA FIELD has been specified. Text will be printed below the bar code symbol unless suppressed by the FONT S parameter.

FONT Default is N (Normal ASCII 10 cpi). An optional parameter used to specify the PDF (Printable Data Field) font. Besides the default, you can enter O to specify OCR-A 10 cpi, or X to specify OCR-B 10 cpi. You can suppress the PDF and trailing lower portions of the UPC bar code by entering S.

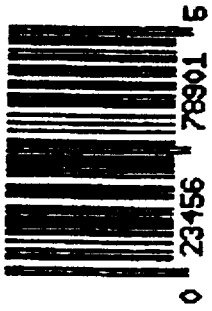
Note: OCR-A and OCR-B fonts are not permitted with vertical bar codes. If vertical and PDF options are selected, the readable data will be printed in normal 10 cpi regardless of the font specification.

UPC-A Programming Example:

```
~CREATE;BC_UPCA          /create form for bar code
BARCODE                  /Bar Code command
UPC-A;DARK;20;30         /print dark at SR 20, SC 30
“02345678901”            /data field
PDF                      /print human-readable data
STOP                     /terminate Bar Code command
BARCODE                  /second Bar Code command
UPC-A;VSCAN;H10;30;30    /vertical; height 10; SR 30; SC 30
“02345678901”            /data field
PDF                      /print human-readable data
STOP                     /terminate Bar Code command
END                      /terminate Create Mode
~EXECUTE;BC_UPCA         /print bar code

~NORMAL                  /return to the Normal Mode
```

Print Sample



UPC-E Bar Code Structure

Quiet Zone	11-module quiet zone automatically provided; user's form must provide space for a minimum of a 7-module right quiet zone. The number system character is printed in the left quiet zone.
Number System Character	This number is taken from the first character in the data field. It is used to apply a code to a class or type of item.
Data Field	Numeric (fixed 11 digits), marked by Start/Stop Codes. This bar code symbol provides a limited character set of numerics 0-9 and Special Characters Start, Center and Stop. A series of bars and spaces vary in width from 1 to 4 modules (the smallest increment that can represent data). Each character consists of 4 bars: 2 dark bars and 2 light bars that total 7 modules. Exceptions: The Start/Stop code bar patterns have 2 dark bars and 1 light bar for a total of 3 bars; the Center code bar pattern has 2 dark bars and 3 light bars for a total of 5 bars. The 11 digits are compressed into 6 encoded UPC-E symbols.
Add-On Data	Optional. Add-On data (2-5 digits) can be placed at the end of the bar code. The Add-On code identifies either a 2-digit periodical issue number or 5-digit price data. Enter "+2" or "+5" as the optional parameter. A 9-module separation will exist between the first bar code of the Add-On data and the last bar of the UPC symbol and a left guard pattern. There is no center or right guard pattern.
Readable Data	Optional. Can be printed below the bar code symbol.
Check Digit	Modulo-10 check digit automatically inserted. Check digit formula includes the number system character.

UPC-E Bar Code Command Syntax:

BARCODE<LF>
UPC-E[+n][;VSCAN][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;FONT]]<LF>
STOP<LF>

UPC-E Bar Code Parameters:

Refer to Common Bar Code Parameters for entries not covered below.

UPC-E Bar code type; enter UPC-E.

+n Optional Add-On Data Field: Enter “+2” or “+5” to designate an additional 2- or 5-digit data field.

DATA FIELD The expected 11-digit entry consists of a 0 (as the number system character), followed by the 5-digit Manufacturer Number; followed by the 5-digit Item Number. The entry sequence must conform to one of the number pattern sequences shown in the table below. SmartGraphics will compress these 11 characters down to the 6 encoded UPC-E symbol characters. Refer to the Bar Code Add-On (UPC and EAN styles) in this chapter for Add-On data specifications.

Character	Hex	Character	Hex
0	30	5	35
1	31	6	36
2	32	7	37
3	33	8	38
4	34	9	39

The following table shows the UPC-E number pattern sequences:

If the Manufacturer Number is:	The Item Number Pattern must be:	And the Encoded UPC-E Bar Code Symbol will be:
X X 0 0 0	0 0 0 0 0	X X 0 0 0 0
X X 3 0 0	. . .	X X . . . 1
X X 2 0 0	0 0 9 9 9	X X 9 9 9 2
X X 3 0 0	0 0 0 0 0	X X 3 0 0 3
.	. .	X X . . . 3
X X 9 0 0	0 0 0 9 9	X X 9 9 9 3
X X X 1 0	0 0 0 0 0	X X X10 4
	.	X X X . . 4
X X X 9 0	0 0 0 0 9	X X 9 9 9 3
X X X X 1	0 0 0 0 5	X X X X 1 5
.		X X X X . .
X X X X 9	0 0 0 0 9	X X X X 9 9
Note: X May range from 0 to 9		

UPC-E Bar Code Parameters (Continued):

PDF Printable Data Field (human-readable text): This optional parameter is not permitted if a null DATA FIELD has been specified. Text will be printed below the bar code symbol unless suppressed by the FONT S parameter.

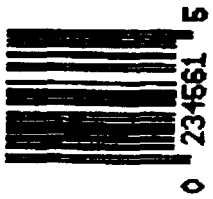
FONT Default is N (Normal ASCII 10 cpi). An optional parameter used to specify the PDF (Printable Data Field) font. Besides the default, you can enter O to specify OCR-A 10 cpi, or X to specify OCR-B 10 cpi. You can suppress the PDF and trailing lower portions of the UPC bar code by entering S.

Note: OCR-A and OCR-B fonts are not permitted with vertical bar codes. If vertical and PDF options are selected, the readable data will be printed in normal 10 cpi regardless of the font specification.

UPC-E Bar Code Programming Example:

```
~CREATE;BC_UPCE          /create form for bar code
BARCODE                  /Bar Code command
UPC-E;DARK;20;30         /print dark at SR 20, SC 30
“02345678901”            /data field
PDF                      /print human-readable data
STOP                     /terminate Bar Code command
BARCODE                  /second Bar Code command
UPC-E;VSCAN;H10;30;30    /vertical; height 10; SR 30; SC 30
“02345678901”            /data field
PDF                      /print human-readable data
STOP                     /terminate Bar Code command
END                      /terminate Create Mode
~EXECUTE;BC_UPCE         /print bar code
~NORMAL                  /return to the Normal Mode
```

Print Sample



MSI Bar Code Structure

Quiet Zone	0.25 inch minimum.
Data Field	Numeric (variable length), marked by Start/Stop Code. The structure consists of 4 wide and 4 narrow bars and spaces. Each character consists of 4 data bits. Each zero bit is a narrow/wide space configuration, each 1 bit is a wide bar/narrow space configuration.
Readable Data	Optional. Can be printed above or below bar code symbol.
Check Digit	The checksum is automatically calculated and inserted into the symbol immediately preceding the STOP character. The check character is a modulus 103 checksum that is calculated by summing the start code value plus the products of each character position (most significant character position=1) and the character value of that position. The sum of the start code value and the products is then divided by 103. The remainder of the answer is the check digit.
Check Digit	Modulo-10 or modulo-11 (or combination) specified by command parameter. The check digit formula includes the number system character.

MSI Bar Code Command Syntax:

BARCODE<LF>
MSIX[;VSCAN]**[;MAG]**[;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

MSI Bar Code Parameters:

(Refer to Common Bar Code Parameters for entries not covered below.)

MSI	Bar code type; enter MSI.
X	Check Digit Designator. Replace X with one of the following codes based on the desired check digit type: Single digit modulo-10 followed by a second modulo-10 digit; enter A. Single digit modulo-11 followed by a single modulo-11 digit; enter B. Single digit modulo-10; enter C. Single digit modulo-11; enter D.

MSI Bar Code Parameters (Continued):

MAG

Magnify (default is X1): This optional parameter is used to expand the bar code symbol horizontally; that is, increase the character density to facilitate scanning. Replace MAG with values of X1 through X10 to expand the bar code as described in the table below.

	Number of Dots on		Number of Dots on	
	1/160 Centers Horz. Scan	1/144 Centers Vert. Scan	1/160 Centers Horz. Scan	1/144 Centers Vert. Scan
	Bar Type		Space Type	
Magnification	Narrow	Wide	Narrow	Wide
X1 (Default)	1	3	3	5
X2	2	5	4	7
X3	3	7	5	9
X4	4	9	6	11
X5	5	11	7	13
X6	6	13	8	15
X7	7	15	9	17
X8	8	17	10	19
X9	9	19	11	21
X10	10	21	12	23

DATA FIELD

Variable length numeric,14 digits maximum if 1-character check digit specified; 13 digits maximum if 2-character check digit specified. Replace DATA FIELD with the desired bar code characters. A null data field (no characters) is allowed. Numerics are limited to those listed in the table below. Do not use the DATA FIELD parameter if bar code data will be dynamically entered (refer to BFn;L parameter).

Character	Hex	Character	Hex
0	30	5	35
1	31	6	36
2	32	7	37
3	33	8	38
4	34	9	39

PDF

Printable Data Field (human-readable text): This optional parameter is not permitted if a null DATA FIELD has been specified.

LOC

Location (default is B or Below): An optional parameter used to place the PDF (Printable Data Field) above (A) or below (B) the bar code symbol. Enter A if you want to locate the PDF above the bar code. The height of the bars will be reduced 0.1 inch to allow for printing the 0.1 inch high PDF.

MSI Bar Code Parameters (Continued):

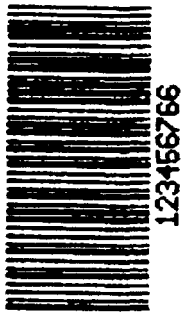
FONT	Default is N (Normal ASCII 10 cpi). An optional parameter used to specify the PDF (Printable Data Field) font. Besides the default, you can enter O to specify OCR-A 10 cpi, or X to specify OCR-B 10 cpi.

Note: OCR-A and OCR-B fonts are not permitted with vertical bar codes. If vertical and PDF options are selected, the readable data will be printed in normal 10 cpi regardless of the font specification.

MSI Bar Code Programming Example:

```
~CREATE;BC_MSI          /create form for bar code
BARCODE                 /Bar Code command
MSIA;DARK;20;30         /print dark at SR 20, SC 30
“1234567”               /data field
PDF                     /print human-readable data
STOP                    /terminate Bar Code command
BARCODE                 /second Bar Code command
MSIB;VSCAN;H10;27;30    /vertical; height 10; SR 27; SC 30
“1234567”               /data field
PDF                     /print human-readable data
STOP                    /terminate Bar Code command
END                     /terminate Create Mode
~EXECUTE;BC_MSI         /print bar code
~NORMAL                 /return to the Normal Mode
```

Print Sample



POSTNET Bar Code Structure

Note: Specific POSTNET bar code requirements can be obtained from Publication 25: "A Guide to Business Mail Preparation" published by the U.S. Postal Service.

Clear Zone	Like the Quiet Zone required by other bar code structures, the POSTNET code must be bordered on all sides by a blank Clear Zone to ensure accurate reading.
Start/Stop Code	The start and stop codes, referred to as "framing bars" in POSTNET, is one tall bar identifying the leading and trailing ends of the bar code. The printer automatically produces the start/stop code with each bar code.
Data Field	Numeric (fixed 10 digits). The bar code data produces a single field of 50 bars, grouped in sets of five. Each set of five bars (comprised of 2 tall bars and 3 short bars) represents each of the digits in the zip code, plus the 4-digit zip code extension; the tenth digit represents the automatic check digit character.
Check Digit	The check digit is added automatically to verify accurate scanning.

POSTNET Command Syntax

BARCODE<LF>
POSTNET[;BFn;L];SR;SC<LF>
[(D)**DATA FIELD**(D)]<LF>
STOP<LF>

POSTNET Bar Code Parameters:

Refer to Common Bar Code Parameters for entries not covered below. Note: DARK or VSCAN parameters are not allowed in the POSTNET bar code command.

POSTNET	Designates bar code type; enter POSTNET.
DATA FIELD	The numeric characters for the bar code. Refer to the U.S. Postal Service's Publication 25 and enter up to the maximum number of digits allowed. If more data is provided than allowed, a data length error will occur. The characters available for the data field are 0 through 9 (31 through 39 hex).

POSTNET Bar Code Programming Example:

```
~CREATE;BC_POST          /create form for bar code
BARCODE                  /Bar Code command
POSTNET;20;30            /print at SR 20, SC 30
"12345"                  /data field
STOP                     /terminate Bar Code command
END                      /terminate Create Mode
~EXECUTE;BC_POST         /print bar code
~NORMAL                  /return to the Normal Mode
```

Print Sample

Bar Code Add-On Data (UPC and EAN styles)

SmartGraphics can add extended data fields (including the optional human-readable data field) to the UPC and EAN bar codes. This Add-On data is useful for representing UPC periodical issue number or EAN price data.

The syntax for the Add-On data field is specified with the individual UPC and EAN bar codes commands covered earlier in this chapter. The parity patterns required by the +2 and +5 parameters are shown in the following tables.

2 Digit Add-On Parity Pattern							
Add-On #	Parity	Add-On #	Parity	Add-On #	Parity	Add-On #	Parity
00	00	25	0E	50	E0	75	EE
01	0E	26	E0	51	EE	76	00
02	E0	27	EE	52	00	77	0E
03	EE	28	00	53	0E	78	E0
04	00	29	0E	54	E0	79	EE
05	0E	30	E0	55	EE	80	00
06	E0	31	EE	56	00	81	0E
07	EE	32	00	57	0E	82	E0
08	00	33	0E	58	E0	83	EE
09	0E	34	E0	59	EE	84	00
10	E0	35	EE	60	00	85	0E
11	EE	36	00	61	0E	86	E0
12	00	37	0E	62	E0	87	EE
13	0E	38	E0	63	EE	88	00
14	E0	39	EE	64	00	89	0E
15	EE	40	00	65	0E	90	E0
16	00	41	0E	66	E0	91	EE
17	0E	42	E0	67	EE	92	00
18	E0	43	EE	68	00	93	0E
19	EE	44	00	69	0E	94	E0
20	00	45	0E	70	E0	95	EE
21	0E	46	E0	71	EE	96	00
22	E0	47	EE	72	00	97	0E
23	EE	48	0E	73	0E	98	E0
24	00	49	E0	74	E0	99	EE

5-digit Add-On Parity Patterns

Do the following calculations on your Add-on numbers to compute the 5-digit parity pattern (X):

1. Add together the first, third, and fifth numbers, and then multiply that sum by 3.
2. Add together the second and fourth numbers, and then multiply that sum by 9.
3. Add together the step 1 and 2 results (products). X is the units value (i.e., the least significant digit).
4. Select the corresponding parity value for X from the table.

Example: If your Add-On number is 54321:

1. 5 + 3 + 1 = 9; 9 x 3 = 27
2. 4 + 2 = 6; 6 x 9 = 54
3. 27 + 54 = 81 (X = 1)
4. The parity pattern for 1 is E0E00.

Parity Pattern Table

"X"	Parity Pattern
0	EE000
1	E0E00
2	E00E0
3	E000E
4	0EE00
5	00EE0
6	000EE
7	0E0E0
8	0E00E
9	00E0E

Incremental Bar Code Fixed Data Fields

This bar code command is the equivalent of the Incremental Alphanumeric Fixed Data Fields command explained in Chapter 3. Like the Alpha command, it is a modified version of the standard bar code command. It should be used only when automatic incrementing of fixed bar code data field is required.

The format for the incremental bar code fixed data fields command is shown below. The parameters shown in bold type face are explained in detail. Refer to the individual bar code command for other parameter specifications. Refer also to Chapter 3, Incrementing Alphanumeric Data, for examples of the STEPMASK and STARTDATA parameters.

Incremental Bar Code Fixed Data Command Syntax:

BARCODE<LF>
type;[VSCAN;][MAG;][Hn;]**I**;[DARK;]SR;SC<LF>
[idir]STEPMASK;[RPTnnn;][RSTnnn;](D)STARTDATA(D)<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<L

Incremental Bar Code Fixed Data Parameters:

I	Increment: Identifies the bar code command as the Incremental Bar Code Fixed Data Fields command.
idir	Increment Direction (default is to increment): An optional parameter used to specify the arithmetic effect of the step on the data field. Enter “+” to increment (add step amount to) or enter “-” to decrement (subtract step amount from) the data field.
STEPMASK	Specifies the increment amount (step), data field length, and mask to control incrementing. Refer to Chapter 3, Incrementing Alphanumeric Data for details.
RPTnnn	Repeat count Repeat Count (default is 1; i.e., increment with each printing): An optional parameter used to specify the number of times to repeat a field value before incrementing it. This feature is useful for printing multiple copies of a form (such as a label) before changing the data field. To use this option, enter RPT and replace nnn with the repeat count (1 to 65535).
RSTnnn	Reset Count (default is zero; no reset): An optional parameter used to specify the number of times to print an incremented field (on one or more forms) before resetting it to its starting value. This feature is useful if the data field consists of levels of subfields; e.g., job/phase/item number generation. The item number can be generated, reset, and then the phase incremented, etc. To use this option, enter RST and replace nnn with the reset count (1 to 65,535).
STARTDATA	The starting value of bar code data field to be incremented. The number of STARTDATA characters must be equal to or less than the number of characters in the STEPMASK parameter. The bar code type dictates the allowable characters for STARTDATA. The STARTDATA entry must be enclosed within the standard delimiters (commonly quote marks); e.g., “123ABC001”. (Refer to the Chapter 3, Incrementing Alphanumeric Data, for details.)

Incremental Bar Code Dynamic Data Fields

This bar code command is the equivalent of the Incremental Alphanumeric Dynamic Data Fields command explained in Chapter 3. Like the Alpha command, it is a modified version of the standard bar code command.

Use this bar code command to specify the position and size of the incremental dynamic data field under the Create Form Mode. The STEPMASK and STARTDATA parameters are entered in the Execute command under the Execute Forms Mode. The starting data for both standard and incremental dynamic data fields can be changed without changing the form definition program. You can also change the incremental parameters with each new print job without changing the form definition program.

The format for the incremental bar code fixed data fields command is shown below. The parameters shown in bold type face are explained in detail. Refer to the individual bar code command for other parameter specifications. Refer also to Chapter 3, Incrementing Alphanumeric Data, for examples of the STEPMASK and STARTDATA parameters.

Incremental Bar Code Dynamic Data Command Syntax:

BARCODE<lF>
type;[VSCAN;][MAG;][Hn;]**IBFn;L**;SR;SC<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

Incremental Bar Code Dynamic Data Parameters:

The following bar code parameters are unique to the Incremental Bar Code Dynamic Data Field command. These parameters must be used to enable the dynamic entry of STEPMASK and STARTDATA parameters during the Execute Forms Mode.

IBFn — Increment Bar Bar Code Field: Identifies the command as the Incremental Bar Code Dynamic Data Fields command. The n parameter numbers the data field for form location. Enter IBF and replace n with a number (1 to 255). The SR (Starting Row) and SC (Starting Column) parameters entered in the standard bar code command specify the exact location of this data field number on the form.

L — Length: Enter a number (1 to 226) to specify the field length for STARTDATA. The number of characters dynamically entered for the STARTDATA parameter must be equal to or less than the value entered for L. The bar code type used dictates the number and type of characters allowed. Refer to the individual bar code command for details.

Duplicating Incremental Bar Code Fields

Refer to Chapter 3, Duplicating Incremental Alphanumeric Fields.

CHAPTER 5. CHARACTER SETS AND FONTS

This printer supports 32 character sets. You can configure the printer to automatically select one of these character sets at power up. see Appendix D, Description of Options Settings. You can also select a particular character set while in operation through one of these commands:

ISET International character set command International Character Set Command
USET User-Defined character set command User-Defined Character Set Command

ISET provides access to the any of the 32 character sets. USET provides the ability to custom design your own character set.

Other command parameters can be used to select desired size or font for text printing.

Font Types

Unless otherwise configured, the default is the standard ASCII character set (10 cpi) when you turn on the printer. The following font types are available and can be selected by command:

10 cpi ASCII	10 cpi international
12 cpi ASCII	12 cpi international
15 cpi ASCII	15 cpi international
17 cpi ASCII	
Expanded ASCII	Expanded international
10 cpi ASCII rotated	10 cpi international rotated
OCR-A ASCII	
OCR-B ASCII	

OCR Character Set Selection

The OCR-A and OCR-B fonts can be selected in the Create, Normal and Execute Modes. In the Create Mode, OCR fonts are accessed using the Alpha command. Refer to Chapter 3, Create Form Mode commands, for Alpha command details.

The format for the standard Alpha command is:

ALPHA
[R[D][L];][E;]**[Cn;]**[AFn;L][DIR;][UC;]]SR;SC;VE;HE;
(D)ASCII Text(D)
STOP

Cn, the optional horizontal compressed print parameter, is used to access the OCR (and other) fonts. If used, C must be followed by an n value of 10, 12, 13, 15, or 17 to specify cpi (characters per inch), or **10A** for 10 cpi OCR-A or **10B** for 10 cpi OCR-B. OCR fonts are available only in 10 cpi.

Note: If Cn is used to select a font, the VE and HE parameters must be set to 0 to avoid an error. Also, the Cn option is not allowed with rotated alphanumerics.

Under the Normal and Execute Modes, OCR fonts are specified with the Compressed Print Density command:

<SFCC>DENSITY;n<LF>

The n parameter specifies the density in cpi, OCR-A, or OCR-B. Enter **10A** to select 10 cpi OCR-A or **10B** to select 10 cpi OCR-B. Like the Alpha command, entries of 10, 12, 13, 15, or 17 specify cpi. Refer to Chapter 1 for Density command details.

Bar Code Font (Printable Data Field)

With the exception of the POSTNET bar code, all bar code commands provide a PDF parameter for selecting the Printable Data Field font type. This font type is used for the human-readable text that is provided above or below the bar code for interpretation.

The typical format of a bar code command syntax is as follows:

BARCODE
(type)[;VSCAN][(magnify)][;Hn][;BFn;L][;DARK];SR;SC
[(D)(data field contents)(D)]
[PDF[;LOC][;FONT]]
STOP

Font selection parameters (also covered for each bar code in Chapter 4) are as follows:

PDF — Printable Data Field (Human-readable data human-readable text): This optional parameter is not permitted if a null data field has been specified. If desired, enter PDF.

LOC — Location: An optional parameter used to place the PDF (human-readable text) above or below the bar code symbol, as allowed by bar code type see Chapter 4 for details.

FONT — Default is **N** (Normal ASCII 10 cpi). An optional parameter used to specify the PDF (Printable Data Field) font. Besides the default, you can enter **O** to specify OCR-A 10 cpi, or **X** to specify OCR-B 10 cpi.

The FONT parameter is not provided by all bar code commands. Where applicable, OCR-A and OCR-B fonts are not permitted with vertically oriented bar codes. If vertical and PDF options are selected, the readable data will be printed in normal 10 cpi regardless of the font specification. Also, UPC and EAN bar codes default to OCR-B font. All other bar code types default to 10 cpi ASCII.

MultinationalCharacter Set

The Multinational Character Sets have 96 characters each. The default character set is ASCII. There are 11 foreign characters sets. 12 sets are reserved for future use. 8 sets can be user-defined.

Because these character sets include foreign sets, they are referred to as the “Multinational Character Sets.” Appendix B contains the charts that give the hexadecimal values for these character sets. There is also an alternate character set referred to as the “Multinational extended character set Multinational Extended Character Set” which includes character values above hex 7F. This is a relative substitution chart (a reference for User-defined character set user-defined character sets) that will be covered by the USET command descriptions.

Access to any character set is by command or by an option (see Appendix D). Individual characters can also be accessed as explained later in this chapter.

The available character sets and their values are shown in the following table:

Character Set	Value	Character Set	Value
U.S. ASCII	0	Dutch	7
German	1	French	8
Swedish	2	Spanish	9
Danish	3	Italian	10
Norwegian	4	Turkish	11
Finnish	5	Reserved	12-23
English	6	User-defined	24-31

There are 12 resident character sets are numbered 0-11. Character sets 12 through 23 are reserved for future use. The eight user-defined sets are numbered 24 through 31. The user-defined character sets can be created by substituting characters from the Multinational Extended Character Set. If a command calls for one of the reserved values (12-23) or a nonexistent user-defined set (24-31), default ASCII set 0 will be selected.

Accessing Characters and Character Sets

Resident character sets are accessed by the ISET command. Individual characters can be accessed by data bit 8 addressing.

International Character Set Command: ISET

Unless changed by configuration options, ASCII is the default (power up) character set. The ISET command can be issued under any mode of operation (Normal, Create or Execute) to select one of the 32 multinational character sets.

The ISET command can be used as many times as required in a form. A character set remains active until replaced by a new ISET command. An ISET command issued in the Execute mode selects the character set for dynamically entered data only, fixed data defined in the Create mode will be unaffected by ISET.

ISET Command Syntax:

<SFCC>ISET;n<LF>

ISET Parameters:

<SFCC>	Special Function Control Character.
ISET	International Character Set Command
n	The character set number. Enter the value (0 to 31) of the desired character set. An n value must be specified.
<LF>	Terminator

Accessing Characters: Data bit 8

Data bit 8 addressing can be used for direct access to individual characters within the Multinational Extended Character Set. The default ASCII character set values occupy hex addresses 20 to 7F. Multinational Extended Character Set values occupy hex addresses 80 to FF.

User-defined Character Set Command: USET

The USET command is used to create a character set by substituting up to 16 characters from the Multinational Extended Character Set. Once defined by the USET command, the character set can be selected by the ISET command.

A comparison of the ASCII and foreign character charts (excluding OCR-A, OCR-B, and Multinational Extended Character Sets) in Appendix B will show that only 16 hex values produce different characters among the various sets. For example, hex 41 produces a capital A regardless of the character set used. But the character produced hex 7B differs among the various sets.

These 16 hex exceptions are:

21	25	5C	7B
22	26	5D	7C
23	40	5E	7D
24	5B	60	7E

To visualize how the USET command works, assume that the characters that correspond to these hex values are removed from the ASCII table, leaving 16 open spaces. The USET command allows you to substitute hex values from the Multinational Extended Character Set in those 16 spaces, which creates a new character set. You can create up to eight such sets. You do not have to use all 16 character positions. OCR characters are not available for substitution.

USET character sets are identified by numbers 1 through 8 and are accessed by ISET numbers 24 through 31. The set you create as USET1 is accessed as ISET24, ISET25, etc.

Created as	**Accessed as**
USET1	ISET24
USET2	ISET25
USET3	ISET26
USET4	ISET27
USET5	ISET28
USET6	ISET29
USET7	ISET30
USET8	ISET31

The USET command can be used only in the Normal Mode.

USET Command Syntax:

<SFCC>USET;n<LF>
Ca;Fa<LF>
. . .
END

USET Parameters:

<SFCC> Special Function Control Character.

USET User-defined Character Set Command

n Specifies the user-defined character set number; enter a value 1 to 8.

Ca Character Cell Address: The hex value of the ASCII cell address to be replaced by the substitute font address (Fa). Enter one of the following 16 hex values: 21,22,23,24,25,26,40,53,5C,5D,5E,60,7B,7C,7D, or 7E.

USET Parameters (Continued):

Fa	Font Address: The hex value of the character to be substituted for the ASCII character cell address (Ca). Enter a value (hex 20 to FF) from the Multinational Extended Character Set.
END	Ends the USET command.
<LF>	Terminator

APPENDIX A. COMMAND SUMMARY

The following is a summary of IGP SmartGraphics commands grouped according to mode of operation. The Special Function Command Character (SFCC) default is a tilde (~). The <LF> denotes a required Line Feed terminator.

Normal Mode Commands

<SFCC>CREATE;[/]FORMNAME[;FL]<LF>

<SFCC>DELETE FORM;FORMNAME<LF>

<SFCC>DELETE LOGO;LOGONAME<LF>

<SFCC>DENSITY;n<LF>

<SFCC>DIRECTORY<LF>

<SFCC>EXECUTE;FORM NAME[;PAGE n][;FC]<LF>

<SFCC>EXPAND;VE;HE<LF>

<SFCC>LISTEN<LF>

<SFCC>LPI;n<LF>

<SFCC>NORMAL<LF>

<SFCC>QUIET<LF>

<SFCC>RESET<LF>

Create Form Mode Commands

ALPHA<LF>
[R[D][L];][E;][Cn;][AFn;L;][DIR;[UC;]]SR;SC;VE;HE;<LF>
(D)ASCII Text(D)<LF>
STOP<LF>

ALPHA<LF>
[R[D];][E;][Cn;]I;[DIR;]SR;SC;VE;HE;[idir]<LF>
STEPMASK;[RPTnnn;][RSTnnn;](D)STARTDATA(D)<LF>
STOP<LF>

ALPHA<LF>
[R[D];][E;][Cn;][IAFn;L;[DIR;]SR;SC;VE;HE;<LF>
STOP<LF>

BARCODE
(See Bar Code Commands)

BOX<LF>
LT;SR;SC;ER;EC<LF>
STOP<LF>

CORNER<LF>
LT;SR;SC;ER;EC;VL;HL<LF>
STOP<LF>

END

LFORM6;nnnn<LF> or LFORM8;nnnn<LF>

Create Form Mode Commands (Continued)

HDUP;DN;OF<LF>
(Elements to be duplicated)
HDUP;OFF<LF>

HORZ<LF>
LT;R;SC;EC<LF>
STOP<LF>

LOGO<LF>
SR;SC;LOGO NAME<LF>
STOP<LF>

<SFCC>NORMAL<LF>

PAGE;SR;SC<LF>

REVERSE<LF>
[DARK;]SR;SC;ER;EC<LF>
STOP<LF>

SCALE;DOT<LF> or SCALE;CHAR[;LPI;CPI]<LF>

<SFCC>SMODE<LF>

VDUP;DN;OF<LF>
(elements to be duplicated)
VDUP;OFF<LF>

VERT<LF>
LT;C;SR;ER<LF>
STOP<LF>

Create Logo Mode Commands

<SFCC>LOGO;LOGO NAME;VL;HL<LF>
RN;D;D1-D2;D<LF>
END<LF>

Execute Form Mode Commands

... [AFn;L;] ... <LF>
(D)ASCII Text(D)<LF>

... [;BFn;L] ... <LF>
[(D)DATA FIELD(D)]<LF>

<SFCC>DENSITY;n<LF>

<SFCC>EXECUTE;FORM NAME[;PAGE n][;FC]<LF>

<SFCC>EXECUTE;NAME[;PAGE n];ICNTnnn[;IRSTnnn]<LF>

<SFCC>EXPAND;VE;HE<LF>

<SFCC>LPI;n<LF>

<SFCC>NORMAL<LF>

Bar Code Commands

BARCODE<LF>
C3/9[CD][;VSCAN][;MAG][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

BARCODE<LF>
C128B[;VSCAN][;MAG][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;LOC]]<LF>
STOP<LF>

BARCODE<LF>
C128C[;VSCAN][;MAG][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;LOC]]<LF>
STOP<LF>

BARCODE<LF>
EAN8[+n][;VSCAN][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;FONT]]<LF>
STOP<LF>

BARCODE<LF>
EAN13[+n][;VSCAN][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;FONT]]<LF>
STOP<LF>

BARCODE<LF>
I-2/5[CD][;VSCAN][;MAG][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

BARCODE<LF>
MSIA[;VSCAN][;MAG][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

BARCODE<LF>
MSIB[;VSCAN][;MAG][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

BARCODE
MSIC[;VSCAN][;MAG][;Hn][;BFn;L][;DARK];SR;SC
[(D)DATA FIELD(D)]
[PDF[;LOC][;FONT]]
STOP

Bar Code Commands (Continued)

BARCODE<LF>
MSID[;VSCAN][;MAG][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

BARCODE<LF>
POSTNET[;BFn;L];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
STOP<LF>

BARCODE<LF>
UPC-A[+n][;VSCAN][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)<LF>]
[PDF[;FONT]]<LF>
STOP<LF>

BARCODE<LF>
UPC-E[+n][;VSCAN][;Hn][;BFn;L][;DARK];SR;SC<LF>
[(D)DATA FIELD(D)]<LF>
[PDF[;FONT]]<LF>
STOP<LF>

Incremental Bar Code Commands

See individual Bar Code command for valid non-incremental parameters.

BARCODE<LF>
type;[VSCAN;][MAG;][Hn;]I;[DARK;]SR;SC<LF>
[idir]STEPMASK;[RPTnnn;][RSTnnn;](D)STARTDATA(D)<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

BARCODE<LF>
type;[VSCAN;][MAG;][Hn;]IBFn;L;SR;SC<LF>
[PDF[;LOC][;FONT]]<LF>
STOP<LF>

Fixed Length Utility Commands

<SFCC>IGON
<SFCC>IGOFF
<SFCC>SFON
<SFCC>SFOFF

Multinational Character Set Commands

Create Mode
<SFCC>ISET;n

Normal or Execute Mode
USETn
Ca;Fa
...
...
End

APPENDIX B. CHARACTER SETS

The charts in this appendix show the character sets and hexadecimal values of each character accessible under IGP SmartGraphics. ASCII is the default character set.

To find the hexadecimal value, combine the column and row addresses of the desired character. From the ASCII chart on the next page, for example, the pound symbol (#) is found in column 2, row 3, which is hexadecimal 23 (also expressed as 23H); a lowercase z is 7A, etc.

ASCII Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	¦
D			-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

ISET parameter 0

German Character Set

H	0	1	2	3	4	5	6	7
0				0	§	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	Ä	k	ä
C			,	<	L	Ö	l	ö
D			-	=	M	Ü	m	ü
E			.	>	N	^	n	β
F			/	?	O	_	o	

ISET parameter 1

Swedish Character Set

H	0	1	2	3	4	5	6	7
0				0	É	P	é	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			¤	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	Ä	k	ä
C			,	<	L	Ö	l	ö
D			-	=	M	Å	m	å
E			.	>	N	Ü	n	ü
F			/	?	O	_	o	

ISET parameter 2

Danish Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	°	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	Æ	k	æ
C			,	<	L	Ø	l	ø
D			-	=	M	Å	m	å
E			.	>	N	^	n	~
F			/	?	O	_	o	

ISET parameter 3

Norwegian Character Set

H	0	1	2	3	4	5	6	7
0				0	É	P	é	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			¤	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	Æ	k	æ
C			,	<	L	Ø	l	ø
D			-	=	M	Å	m	å
E			.	>	N	Ü	n	ü
F			/	?	O	_	o	

ISET parameter 4

Finnish Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			¤	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	Ä	k	ä
C			,	<	L	Ö	l	ö
D			-	=	M	Å	m	å
E			.	>	N	^	n	ü
F			/	?	O	_	o	

ISET parameter 5

English Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			£	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	¦
D			-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

ISET parameter 6

Dutch Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			£	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	Ü	l	ü
D			-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

ISET parameter 7

French Character Set

H	0	1	2	3	4	5	6	7
0				0	à	P	ê	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	û	k	é
C			,	<	L	ç	l	ù
D			-	=	M	§	m	è
E			.	>	N	ô	n	î
F			/	?	O	_	o	

ISET parameter 8

Spanish Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	Ä	k	ä
C			,	<	L	Ñ	l	ñ
D			-	=	M	Ö	m	ö
E			.	>	N	¡	n	¿
F			/	?	O	_	o	

ISET parameter 9

Italian Character Set

H	0	1	2	3	4	5	6	7
0				0	§	P	ù	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	°	k	à
C			,	<	L	é	l	ò
D			-	=	M	|	m	è
E			.	>	N	^	n	ì
F			/	?	O	_	o	

ISET parameter 10

Turkish Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	ş	p
1			η	1	A	Q	a	q
2			Ç	2	B	R	b	r
3			ç	3	C	S	c	s
4			¹	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	Ğ	k	ş
C			,	<	M	Ö	l	ö
D			-	=	M	Ü	m	ü
E			.	>	N	ğ	n	İ
F			/	?	O	_	o	

ISET parameter 11

OCR-A Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	°	°
1			!	1	A	Q	¹	¹
2			"	2	B	R	²	²
3			#	3	C	S	³	³
4			$	4	D	T	⁴	⁴
5			%	5	E	U	⁵	⁵
6			&	6	F	V	⁶	⁶
7			'	7	G	W	⁷	⁷
8			(	8	H	X	⁸	⁸
9			)	9	I	Y	⁹	⁹
A			*	:	J	Z	+	½
B			+	;	K	[	→	¼
C			,	<	L	\	↑	±
D			-	=	M	]	↓	≠
E			.	>	N	^	©	¢
F			/	?	O	←	®	

OCR-B Character Set

H	0	1	2	3	4	5	6	7
0				0	@	P	`	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	¦
D			-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

Multinational Extended Character Set

H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	ş	p	U			°	À	Đ	à	ð
1			η	1	A	Q	a	q	ü		¡	±	Á	Ñ	á	ñ
2			Ç	2	B	R	b	r	Ŗ		¢	²	Â	Ò	â	ò
3			ç	3	C	S	c	s	|		£	³	Ã	Ó	ã	ó
4			¹	4	D	T	d	t	η		¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u	¹		¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v	Ğ		¦	¶	Æ	Ö	æ	ö
7			'	7	G	W	g	w	ğ		§	·	Ç	×	ç	÷
8			(	8	H	X	h	x	Ş		"	¸	È	Ø	è	ø
9			)	9	I	Y	i	y	ş		©	1	É	Ù	é	ù
A			*	:	J	Z	j	z	İ		ª	º	Ê	Ú	ê	ú
B			+	;	K	Ğ	k	ş	¨		«	»	Ë	Û	ë	û
C			,	<	L	Ö	l	ö			¬	¼	Ì	Ü	ì	ü
D			-	=	M	Ü	m	ü			ÿ	½	Í	Ý	í	ý
E			.	>	N	ğ	n	İ			®	¾	Î	Þ	î	þ
F			/	?	O		o				¯	¿	Ï	β	ï	

APPENDIX C. ERROR CODES

This defines the coded error messages that can result from invalid commands. Error codes and messages are presented in numeric order 01 to 155 and are grouped by command or function.

Error Code	Related Command or Function
01-09	Horizontal Line
10-19	Vertical Line
20-29	Box
30-39	Corner
40-49	Alpha
50-51	Logo
60-69	Create
70-79	Execute
80-89	Miscellaneous
90-110	Bar Codes
111-119	Reverse Print
120-129	Printer Mode
130-139	Incremental Fields
140-149	Scaling
150-155	Multinational Character Set

Debug Mode

In order for the printer to produce an error message, you must initiate the Debug Mode by entering a "/ " in the CREATE command sequence as follows:

<SFCC>CREATE;/FORM NAME

The form will not be printed in the Debug Mode. Instead, the printer will print the program and identify error conditions by printing a code and message on any line that contains an error. Only the correct command lines will be stored in memory. Once the errors have been corrected, you should remove the "/" from the CREATE command and run the program again to produce the form and store it in memory.

Execute Mode errors 70 through 79 and miscellaneous errors 80 through 89 will cause the printer to switch to Normal Mode processing.

Horizontal Line Command Errors

01 Row Position is Out of Bounds

The R (Row) parameter value exceeds the form length.

02 Left Column is Out of Bounds

The SC (Starting Column) parameter value specifies a position outside the left form boundary.

03 Right Column is Out of Bounds

The EC (Ending Column) parameter value exceeds the form width.

04 Format or Delimiter Error

One or more of the following format or delimiter error conditions may exist in the command:

a. semicolon (;) missing

b. semicolon (;) replaced by colon (:)

c. Invalid number of parameters

d. Invalid parameter value (i.e., nonnumeric).

05 Memory Overflow

Printer memory lacks sufficient space for another horizontal line. Remaining HORZ commands will be flushed until the Stop command is detected; afterwards, normal processing will continue. Delete any unused forms containing horizontal line elements to free up memory space.

06 Column Positions Are Out of Order

The SC (Starting Column) parameter value is greater than or equal to the EC (Ending Column) parameter value.

07 Improper Line Thickness

The LT (Line Thickness) parameter value is invalid (e.g., zero); LT must be 1 or greater.

08 Unassigned

09 Unassigned

Vertical Line Command Errors

10 Column Position is Out of Bounds

The C (Column) parameter value exceeds the form width.

11 Upper Row is Out of Bounds

The SR (Starting Row) parameter value specifies a position outside the top of form boundary.

12 Lower Row is Out of Bounds

The ER (Ending Row) parameter value exceeds form length.

13 Format or Delimiter Error

One or more of the following syntax error conditions may exist in the command:

a. Semicolon (;) missing

b. Semicolon (;) replaced by colon (:)

c. Invalid number of parameters

d. Invalid parameter value (i.e., nonnumeric).

14 Memory Overflow

Printer memory lacks sufficient space for another vertical line. Remaining VERT commands will be flushed until the Stop command is detected; afterwards, normal processing will continue. Delete any unused forms containing vertical line elements to free up memory space.

15 Row Positions Are Out of Order

The SR (Starting Row) parameter value is greater than or equal to the ER (Ending Row) parameter value.

16 Improper Line Thickness

The LT (Line Thickness) parameter value is invalid (e.g., zero); LT must be 1 or greater.

17 Unassigned

18 Unassigned

19 Unassigned

Box Command Errors

20 Left Column Position is Out of Bounds

The SC (Starting Column) parameter value specifies a position outside the right or left form boundary.

21 Upper Row is Out of Bounds

The SR (Starting Row) parameter value specifies a position outside the form boundaries.

22 Right Column Position is Out of Bounds

The EC (Ending Column) parameter value specifies a position outside the right or left form boundary.

23 Lower Row is Out of Bounds

The ER (Ending Row) parameter value specifies a position outside the form boundaries.

24 Format or Delimiter Error

One or more of the following syntax error conditions may exist in the command:

a. Semicolon (;) missing

b. Semicolon (;) replaced by colon (:)

c. Invalid number of parameters

d. Invalid parameter value (i.e., nonnumeric).

25 Memory Overflow

Printer memory lacks sufficient space for another box. Remaining BOX commands will be flushed until the Stop command is detected; afterwards, normal processing will continue. Delete any unused forms containing box elements to free up memory space.

26 Column Positions Are Out of Order

The SC (Starting Column) parameter value is greater than or equal to the EC (Ending Column) parameter value.

27 Row Positions Are Out of Order

The SR (Starting Row) parameter value is greater than or equal to the ER (Ending Row) parameter value.

28 Improper Line Thickness

The LT (Line Thickness) parameter value is invalid (e.g., zero); LT must be 1 or greater.

29 Unassigned

Corner Command Errors

30 Left Column Position is Out of Bounds

The SC (Starting Column) parameter value specifies a position outside the right or left form boundary.

31 Upper Row is Out of Bounds

The SR (Starting Row) parameter value specifies a position outside the form boundaries.

32 Right Column Position is Out of Bounds

The EC (Ending Column) parameter value specifies a position outside the right or left form boundary.

33 Lower Row is Out of Bounds

The ER (Ending Row) parameter value specifies a position outside the form boundaries.

34 Horizontal Corner Length is Out of Bounds

The HL (Horizontal Length) parameter value specifies an extension beyond the left or right form boundary.

35 Vertical Corner Length is Out of Bounds

The VL (Vertical Length) parameter value specifies an extension beyond the form boundaries.

36 Format or Delimiter Error

One or more of the following syntax error conditions may exist in the command:

a. Semicolon (;) missing

b. Semicolon (;) replaced by colon (:)

c. Invalid number of parameters

d. Invalid parameter value (i.e., nonnumeric).

37 Memory Overflow

Printer memory lacks sufficient space for another corner. Remaining CORNER commands will be flushed until the Stop command is detected; afterwards, normal processing will continue. Delete any unused forms containing corner elements to free up memory space.

38 Column Positions Are Out of Order

The SC (Starting Column) parameter value is greater than or equal to the EC (Ending Column) parameter value.

39 Row Positions Are Out of Order

The SR (Starting Row) parameter value is greater than or equal to the ER (Ending Row) parameter value.

Alpha Command Errors

40 Unmatched Leading and Ending Delimiters

The text string was not properly delimited by matching printable characters before an was detected.

41 Character Row is Out of Bounds

The SR (Starting Row) parameter value calls for the text string to be printed outside the form limits.

Note: The VE (Vertical Expansion) parameter expands text upward from the specified row which can result in an error 41.

42 Column Plus String Length is Out of Bounds

The SR (Starting Column) parameter is causing the alpha string to exceed the left form margin, or SR plus the alpha string exceeds the right margin of the page.

43 Too Many Characters in the Alpha String

The string may contain a maximum of 226 characters.

44 Format or Delimiter Error

One or more of the following syntax error conditions may exist in the command:

a. Semicolon (;) missing

b. Semicolon (;) replaced by colon (:)

c. Invalid number of parameters

d. Invalid parameter value (i.e., nonnumeric).

45 Memory Overflow

Printer memory lacks sufficient space for another alpha string. Remaining ALPHA commands will be flushed until the Stop command is detected; afterwards, normal processing will continue. Delete any unused forms containing alpha string elements to free up memory space.

46 Expanded Characters Have Been Specified as Elongated or Compressed

The VE (Vertical Expansion) or HE (Horizontal Expansion) parameters cannot be used in the ALPHA command sequence with the E (Elongated) and/or Cn (Compressed Print) parameters.

47 (X) Scale Factor is Out of Bounds

The HE (Horizontal Expansion) parameter value exceeds 113.

48 (Y) Scale Factor is Out of Bounds

The VE (Vertical Expansion) parameter value exceeds 113.

49 Error in the Optional Compression Factor

The Cn (Compressed Print) parameter value is invalid; i.e., it specifies other than 10, 12, 13, 15 or 17 cpi.

Create Logo Command Errors

50 Horizontal Length of the Logo or Specified Dot Position in the Logo is Out of Bounds

Two conditions can cause this error:

a. The HL (Horizontal Length) parameter value is zero or it exceeds the 240 maximum. (This condition causes the printer to revert to the Normal mode.)

b. A D or D1-D2 (dot position) value exceeds the horizontal logo grid width. This condi tion causes the printer to flush the buffer until an line terminator is detected. The printer then continues with normal logo creation.

51 Vertical Length of the Logo or Specified Dot Row in the Logo is Out of Bounds

Two conditions can cause this error:

a. The VL (Vertical Length) parameter value is zero or it exceeds the 252 maximum. (This condition causes the printer to revert to the Normal mode.)

b. A D or D1-D2 (Dot position) parameter value exceeds the vertical logo grid length. This condition causes the printer to flush the buffer until an line terminator is de tected. The printer then continues with normal logo creation.

52 Invalid Use of the Hyphen

The D1-D2 (Dot series) parameter values are reversed (out of order) or one of the values is missing. This condition causes the printer to flush the buffer until an line terminator is detected. The printer then continues with normal logo creation.

53 Insufficient Memory to Create Logo

Printer memory lacks sufficient space for the logo size specified. The printer will revert to the Normal Mode. Delete any unused logos or forms containing logo elements to free up memory space.

54 Format or Delimiter Error

One or more format or delimiter error conditions may exist in the command. If an invalid size or name is defined the printer reverts to the Normal Mode. If the error occurs during creation, the printer will flush the buffer until an line terminator is detected. The printer then continues with normal logo creation.

55 No Logo by That Name is Defined

An undefined logo has been called for during the Create Form Mode. (This error is not generated during the Create Logo Mode.) This error causes the printer to flush the buffer until an line terminator is detected. The printer then continues with normal logo creation.

56 Memory Overflow

Printer memory lacks sufficient space for another logo call. Delete any unused logos or forms containing logo elements to free up memory space.

57 Logo Row is Out of Bounds (Logo Call)

The SR (Starting Row) parameter value specifies a position that exceeds the top or bottom form margins. This error causes the printer to flush the buffer until an line terminator is detected. The printer then continues with normal logo creation.

58 Logo Column is Out of Bounds (Logo Call)

The SC (Starting Column) parameter value specifies a position that exceeds the right or left form margins. This error causes the printer to flush the buffer until an line terminator is detected. The printer then continues with normal logo creation.

59 Unassigned

Create Errors

60 Directory is Full

You must delete an unused form or logo before you can create and add a new one to the directory. This error causes the printer to revert to the Normal Mode.

61 No Such Create Function

An invalid command has been issued under the Create Form Mode. This error causes the printer to flush the buffer until a STOP command is detected. The printer then continues processing.

62 Error in the Horizontal Duplication Parameters

An HDUP syntax error has been detected or a parameter value has been exceeded. The DN (Duplication Number) parameter value must be not exceed 255; the OF (Offset) parameter value must not exceed 792 (dot scale). This error causes the HDUP command to be ignored; forms processing continues.

63 Error in the Vertical Duplication Factory

An VDUP syntax error has been detected or a parameter value has been exceeded. The DN (Duplication Number) parameter value must be not exceed 255; the OF (Offset) parameter value must not exceed form length. This error causes the HDUP command to be ignored; forms processing continues.

64 Error in the Scale Factors

A syntax error has been detected or a parameter value is invalid. The LPI (Lines Per Inch) vertical parameter value must be 6, 8, 9, or 10. The CPI (Characters Per Inch) horizontal parameter must be 10, 13, 15, or 17. This error causes the SCALE command to be ignored; forms processing continues.

65 Page Row Position is Out of Bounds

The SR (Starting Row) parameter value exceeds the upper or lower form boundary. This PAGE command error causes the printer to revert to the Normal Mode.

66 Page Column Position is Out of Bounds

The SC (Starting Column) parameter value exceeds the right or left form boundary. This PAGE command error causes the printer to revert to the Normal Mode.

67 Missing Stop Command

A new function command, End command, or mode command has been issued without first terminating the previous command with STOP. Subsequent commands will be processed correctly.

68 Alpha Compressed/Elongated Rotation

A rotated alphanumeric string command contains the compressed or elongated characters option. Rotated alphanumerics cannot be compressed or elongated.

69 Memory Overflow

Printer memory lacks sufficient space for another form. Delete any unused forms to free up memory space.

Execute Errors

70 Error in Specifying the Number of Forms in the Execute Command

The FC (Form Count) parameter value is invalid. This error causes the printer to revert to the Normal Mode.

71 No Such Form in the Directory

An EXECUTE or DELETE command has been issued for a form that does not exist in the forms directory. This error causes the printer to revert to the Normal Mode.

72 Unassigned

73 Unassigned

74 Unassigned

75 Unassigned

76 Error in Page Number

The PAGE n (Pagination) parameter value is invalid, possibly due to incorrect syntax or a page number that is too large. This error causes the printer to revert to the Normal Mode because the page number is part of the Execute command.

77 Format or Delimiter Error in the Execute Command

One or more of the following syntax error conditions may exist in the command:

a. Semicolon (;) missing

b. Semicolon (;) replaced by colon (:)

c. Invalid number of parameters

d. Invalid parameter value (i.e., nonnumeric)

e. Page command misspelled.

The printer will revert to the Normal Mode.

78 Insufficient Memory Available to Execute the Form.

Printer memory lacks sufficient space to recall and execute a form. Delete any unused forms to free up memory space. This error causes the printer to revert to the Normal Mode.

79 Unassigned

Miscellaneous Errors

80 Function Must be Called From Normal Mode

This special function cannot be issued under the Create Form or Execute Form Mode; it must be issued from the Normal Mode. This error will occur if there is a missing END command in the Create Form Mode. For example, the printer will automatically revert to the Normal Mode if you attempt to enter the Create Form Mode while executing a form.

81 No Such Special Function

An unrecognizable special function call was issued. This error causes the printer to revert to the Normal Mode.

82 Numeric Character Input Expected

Alpha characters were detected where numeric digits (0-9) were expected.

83 Error in Decimal Input

The parameter value expected was a decimal number. The number was either omitted or too large (exceeded 66,000) or an alpha character.

84 Error in Delimiter

The semicolon (;) delimiter was expected; the delimiter is either incorrect or missing.

85 Error in XON/XOFF Command

XON/XOFF command parameters are improperly specified; they are out of bounds, or the XON parameter is greater than the XOFF parameter. In any case, the command is ignored.

86 Error in the DENSITY command

The DENSITY command parameter must specify 10, 10A, 10B, 12, 13, 15, or 17 cpi. The command is ignored.

87 Error in the LPI command

The LPI command parameter must specify 6, 8, 9, or 10 lpi. The command is ignored and processing continues.

88 Serial Input Buffer Overflow

The host computer is ignoring protocol and characters have been lost. Subsequent print will probably be garbled.

89 Error in the EXPAND Command

The VE (Vertical Expansion) or HE (Horizontal Expansion) parameter values are not within the 0-113 range, or there is a syntax error. The command is ignored and processing continues.

Bar Code Errors

90 Memory Overflow

Printer memory lacks sufficient space for another bar code. This error causes the printer to flush the remaining bar code commands until a STOP command is detected. The printer then continues normal processing.

91 Syntax Error in Command String

One or more of the following syntax error conditions may exist in the command:

a. Misspelled keyword

b. Use of lowercase

c. Semicolon (;) missing

d. Semicolon (;) replaced by colon (:)

e. Invalid number of parameters

f. Invalid parameter value (i.e., nonnumeric)

g. No ending delimiter for data field.

This error causes the printer to flush the remaining command lines until a STOP command is detected. The printer then continues normal processing.

92 Magnification Factor Out of Bounds

The MAG (Magnification) parameter factor is not within specifications. Refer to the applicable bar code command for details.

93 Starting Row Out of Bounds

The SR (Starting Row) parameter value exceeds the upper or lower form boundary.

94 Starting Column Out of Bounds

The SR (Starting Column) parameter exceeds the left or right form margin.

95 Height is Out of Bounds

The Hn (Height) parameter value does not fall within the specified range (4 through 99).

96 Illegal Character in Data Field

A missing end delimiter can cause this error. Otherwise, refer to the applicable bar code command for the acceptable data field characters.

97 Data Field is too Short or too Long

Refer to the applicable bar code command for the acceptable number of data field characters.

98 Bar Code (or Vertically Duplicated Bar Codes) Exceeds Form Length

The VDUP command parameter values cause the bar code symbol print to exceed the lower form limit.

99 Bar Code (or Horizontally Duplicated Bar Codes) Exceeds Right Margin

The HDUP command parameter values cause the bar code symbol print to exceed the right margin.

100 Bar Code is too Wide (Exceeds 720 Dots in Length)

The designated bar code symbol exceeds 720 dot columns (if horizontally oriented) or 1440 dot rows (if vertically oriented). You must enter a lower magnification factor or decrease the number of data field characters.

101 Invalid Font Selection in the PDF (Print Data Field) Parameter

The PDF parameter value must be N, O, X, or S. Refer to the applicable bar code command for details.

102 Dynamic Data Field is Too Long

An attempt was made to supply a dynamic data field that is longer than specified in the Create Form Mode.

103 Must Be Inserted At Top of Form

The attempt was made to supply dynamic data after form printing was initiated.

104 Dynamic Data Field Not Previously Defined in the Form

An attempt was made to specify a dynamic data field in the Execute Form Mode that was not defined in the Create Form Mode.

105 Dynamic Field Number is Out of Bounds

The AFn (Dynamic Alpha Field Number) parameter value is not within 1-255 range.

106 Dynamic Bar Code Exceeds Form Width

The maximum form width was exceeded by the dynamic bar code symbol.

107 Dynamic Alpha Data Field Undefined

The specified dynamic alpha field number was not previously defined in the Create Form Mode.

108 Check Digit is Out of Bounds

The UPC-A bar code is positioned so close to the edge of the page that the check digit print will exceed the margin.

109 Unassigned

110 Unassigned

Reverse Print Errors

Verify the command syntax and make necessary entries to correct the following errors:

111 Format Error in Input Parameters

112 Starting Row or Ending Row Out of Bounds

113 Starting Column or Ending Column is Out of Bounds

114 Memory Overflow

115 Unassigned

116 Unassigned

117 Unassigned

118 Unassigned

119 Unassigned

Printer Mode Errors

120 Not First Function Called

121 SR is Out of Bounds

122 Illegal Move

123 Too Many Modes

124 Syntax Error

An illegal character or delimiter has caused a syntax error.

125 Memory Overflow

There is not enough room in the memory for the command.

126 Bad Form Length Parameter

LFORM parameter values must be 6 or 8. Total number of lines per form range from 1 to 5461 (6 lpi), or from 1 to 7281 (8 lpi).

127 Unassigned

128 Unassigned

129 Unassigned

Incremental Field Errors

130 Incremental Create Command Syntax Error

131 Incremental STEPMASK Parameter Error

132 Incremental Repeat or Reset Count Parameter Error

133 Incremental STEPMASK/STARTDATA Length Error

The dynamic STEPMASK exceeds created field length or STARTDATA exceeds STEPMASK.

134 Incremental Execute Command Syntax Error

135 Incremental STARTDATA Parameter Error

136 Incremental STEPMASK/STARTDATA Mismatch

137 Unassigned

138 Unassigned

139 Unassigned

Scaling Command Errors

140 Not the First Command in the Create Form Mode

This condition is not applicable when SCALE is used in the Normal Mode; it applies only to Create Form Mode.

141 Syntax Error

One or more of the following syntax error conditions may exist in the command:

a. Misspelled keyword

b. Use of lowercase

c. Semicolon (;) missing

d. Semicolon (;) replaced by colon (:)

e. Invalid number of parameters

f. Invalid parameter value (i.e., nonnumeric)

g. Improper command terminator.

142 Unassigned

143 Unassigned

144 Unassigned

145 Bad Decimal Input

Alpha input has been detected where a numeric was expected, or the numeric input was too large.

146 Unassigned

147 Unassigned

148 Unassigned

149 Unassigned

Multinational Character Set Errors

150 Bad ISET Parameter

An invalid ISET value (outside the allowable range, 0 to 31) was specified, or alpha was detected where a numeric was expected.

151 Decimal Input Error in USET Command

USET requires a numeric parameter value. The printer either found no entry or alpha instead.

152 Bad USET Parameter

An invalid USET character set value (outside the allowable range, 1 to 8) was specified, or alpha was detected where a numeric was expected.

153 Illegal Character Substitution

An invalid Ca character substitution has been specified in the USET command. The following 16 hex cell addresses are allowed for the Ca parameter: 21, 22, 23, 24, 25, 26, 40, 5B, 5C, 5D, 5E, 60, 7B, 7C, 7D, or 7E.

154 Illegal Character Defined

An invalid Fa character value has been specified in the USET command. The allowable character entries for the Fa parameter are between 20 and FF hex.

155 Syntax Error

Possibly the END command has been omitted from the USET command sequence.

APPENDIX D. DESCRIPTION OF OPTIONS SETTINGS

This appendix explains the firmware option settings (1-48) provided under the SmartGraphics IGP emulation. For further explanations concerning these options and procedures to change them, refer to the Appendix in the User's Manual for the printer concerned. (NOTE: The settings of "OFF/ON" are equivalent to "OUT/IN", "DIS/ENB" or "DISABLE/ENABLE".)

Other Models

In some models, the settings described in this appendix are accessed through the LCD menu options. Refer to the User's Manual for procedures and explanations for IGP option settings.

Interface Type

Function: Selects serial or parallel interface.

Set this bit to the host interface used.

1	
Off	RS-232 Serial Interface
On	Parallel Interface

The RS-232 Serial Interface will operate with the following defaults:

- The Serial interface will support XON/XOFF with RTS protocol only.
- Strap 8 will be used to access characters 80-FF hex.
- Robust XON operations available via strap 5.

The CENTRONICS Parallel Interface will operate with the following defaults:

- FAULT is active LOW.
- PAPEROUT is active HIGH.
- SELECT is active HIGH.
- BUSY by CHARACTER.
- No Paper Instruction Lead.

Parity Type, Data/Stop Bits (Serial)

Set these bits to match the number of data and stop bits and the type of parity used by your host computer.

2	3	4	7 data bits, 2 stop bit, even parity.
On	On	On	RS-232 Serial Interface
On	On	Off	7 data bits, 2 stop bit, odd parity.
On	Off	On	7 data bits, 1 stop bit, even parity.
On	Off	Off	7 data bits, 1 stop bit, odd parity.
Off	On	On	8 data bits, 2 stop bit, no parity.
Off‘	On	Off	8 data bits, 1 stop bit, no parity.
Off	Off	On	8 data bits, 1 stop bit, even parity.
Off	Off	Off	8 data bits, 1 stop bit, odd parity.

Transmitting XON When Idle (Serial)

To enable ROBUST XON protocol, set this to ON to transmit an XON signal (printer ready) to the host every second whenever the printer is idle.

5	
Off	Transmit XON when idle.
On	Do not transmit XON when idle.

Baud Rate (Serial Only)

6	7	8	Baud Rate
Off	Off	Off	300
Off	Off	On	600
Off	On	Off	1200
Off	On	On	2400
On	Off	Off	4800
On	Off	On	9600
On	On	Off	19200
On	On	On	38400

Reserved For Future Use

9	Reserved for Future Use

SmartGraphics Diagnostic Mode

This bit is used to put the SmartGraphics Processor into a diagnostic (Hex Dump) mode. The processor will send a configuration (status) message to be printed the first time the printer is put online after this option is set. The processor will then enter Hex Dump mode until the option is reset.

10	
Off	Diagnostics and Hex Dump OFF.
On	Diagnostics and Hex Dump ON.

Note: The last line of a hex dump is not printed until the printer is taken off line and put back on line.

Density Bar Codes Densities

Set these bits to set the Bar Code print density.

11	12	
Off	Off	Print Bar Codes in Low Density.
Off	On	Print Bar Codes in Double Horizontal Density.
On	Off	Print Bar Codes in Staggered Format.
On	On	Invalid (Low Density).

Note: The staggered format is normally the best compromise between speed of printing and readability of the barcode.

XOFF CONTROL

Function: Selects if single or multiple XOFF's are sent to host when printer goes busy.

13	
Off	XOFF sent once at BUFFER HIGH TRIP point
On	XOFF sent at BUFFER HIGH TRIP point and every 20 characters thereafter

P-Series SFCC Mode ONLY

Function: Selects the Special Function Control Code (SFCC) used while in the p-series emulation.

14	15	16	
Off	Off	Off	lB (ESC)
Off	Off	On	03 (ETX)
Off	On	Off	01 (SOH)
Off	On	On	5E (HAT^)
On	Off	Off	7E (TILDE ~)
On	Off	On	7E,5D (TILDE, RIGHT BRACKET ~])
On	On	Off	DEFAULT TO ESC
On	On	On	DEFAULT TO ESC

Note: The code selected here, must be the same as the code selected in the p-series emulation menu under PRG/SFCC Select.

Not Used By IGP

17-31	Not used by lGP

Special Function Control Character - IGP(SFCC)

Set these options to the binary value from the table which represents the desired GRAPHIC control character. The default value is Hex 7E, the “~” character.

33	34	35	Character
Off	Off	Off	~ 7EH
Off	Off	On	@ 40H
Off	On	Off	! 21H
Off	On	On	| 7CH
On	Off	Off	^ 5EH
On	Off	On	‘ 60H
On	On	Off	? 3FH
On	On	On	\ 5CH

Character Set Select

Selects the power-up default for the Multinational Character Set Feature.

36	37	38	39	Character Set
Off	Off	Off	Off	ASCII
Off	Off	Off	On	German
Off	Off	On	Off	Swedish
Off	Off	On	On	Danish
Off	On	Off	Off	Norwegian
Off	On	Off	On	Finnish
Off	On	On	Off	English
Off	On	On	On	Dutch
On	Off	Off	Off	French
On	Off	Off	On	Spanish
On	Off	On	Off	Italian
On	Off	On	On	Turkish

Note: Undefined settings default to ASCII.

Sequence Terminator

40	Terminator
Off	LF
On	CR

Note: The character used to terminate a command sequence will not cause any other action to take place. For example, with option 40 Off, the first LF following a command will terminate the command line, it *will not* cause the printer to move paper.

Delete Logo Control

41	
Off	Deletion of form deletes form
On	Deletion of form deltes form and associated logo files

Note: The delete form command will delete the named form and the delete logo command is used to delte the named logo. Option 41 provides the capability to delete all logos used on a form by just using the DELETE FORM command.

Power Up in Quiet Mode

Set option ON to enable the Quiet mode at power up or to Off to disable the Quiet mode at power up. When the printer is enabled for the Quiet mode, all characters are passed unprocessed to the printer. The Listen command will disable the Quiet mode.

42	
Off	Disable QUIET at power-up
On	Enable QUIET at power-up

Enable Default to OCR-B

43	
Off	Normal font (DP) default in IGP
On	OCR-B font default in IGP

Reserved for Future Use

44	Reserved for Future Use

Error Reporting

45	
Off	Serial interface error reporting not active
On	Serial interface error reporting active

Note: Option 45 = OFF - Errors from the serial interface (Parity, Framing, UART overrun, Buffer overrun) will be be reported to the printer by replacing the character in error with an astrick (“*”). No additional action will be taken. Option 45 = ON = Errors from the serial interface (Parity, Framing, UART overrun, Buffer overrun) will be be reported to the printer by replacing the character in error with an astrick (“*”). Additionally, an escape sequence will be sent to the printer indicating the type failure (the printer will display/print and error message, deselect, and wait for operator intervention).

Multisource Selection

46	
Off	Multisource not selected
On	Multisource selected (overrides option 1)

Note: This option overrides the interface selection made by option 1. In the Multisource mode the printer will receive data from both interfaces, printing from the currently active interface, and reflecting busy to the other interface once its buffer is full. Printing from the inactive interface is controlled by the cessation of data input on the currently active interface and the selected delay (see options 47-48).

Multisource Interface Delay

47	48	Seconds
Off	Off	30
Off	On	60
On	Off	90
On	On	120

Ignore Character Selection

Provides a means to cause an unwanted character to be discarded from the input data stream.

47 to 56	49 - High bit of character

Some systems may generate a pad character which is not intended to be printed.

Note: Option 44 must be ON for these options to affect the input data.

Reserved for future use

57-64	Reserved for Future Use

3800/3900 Series - Checking Status and Setting Options

The emulation and software options control less frequently adjusted aspects of the configuration of the printer. These options are set from the printed menu. Unlike other menu items, the menu doesn't print out a description of each option. The options are described earlier in the appendix under the settings options descriptions.

The main purpose of following text is to show how to check the status of the SmartGraphics emulation options menu and how to change an option.

The steps to view the status of the SmartGraphics emulation options are as follows:

1. With the printer offline, press **ENTER** to enter the LCD menu (display shows **PROG:Exit**).
2. Press the up arrow key once. The display switches to **PROG: Pr Menu**.
3. Press the **ENTER** key. The main menu prints out.
4. Press **9** and then **ENTER** to enter the Other Options menu.
5. Press **1** and **ENTER** to enter the SGL Options menu. A list similar to the following prints out:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DIS	DIS	ENB	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	ENB	ENB	DIS	DIS	DIS
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
DIS	ENB	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS

Note: ENB = enabled; DIS = disabled

To change an option from enabled to disabled or vice versa, press the numbered key(s) for the number of the option to be changed and then press [ENTER]. For example, if option 10 is disabled (as shown above), and that option is to be enabled, press [1] and then [0] and then [ENTER].

When the changes are completed, exit through the main menu.

4800/4900 Series - Checking Status and Setting Straps

To change the strap settings in 4800/4900 series printers, enter the Program Mode by pressing the **PROGRAM** pushbutton while in **Local**.

The Program Mode uses an extensive menu of options to set up and control the printer's operation. See the User's Manual for the fold out diagram showing the menu structure and displays to expect.

While in the Program Mode:

- Pressing the **NEXT OPTION** (**0**) or **PREVIOUS OPTION** (**1**) pushbuttons causes the display to change to the next menu or option.
- Pressing the **ENTER** (**4**) pushbutton causes the printer to enter a sub-menu or perform the operation showing on the display.
- Pressing the **EXIT** (**3**) pushbutton causes the display to return one step up the menu tree or to **Local** if already at the top level.
- Pressing the **QUIT** (**2**) pushbutton causes the display to leave the Program Mode and return to **Local**.

To print a status report in 4800/4900 series printers, enter the Function Mode by pressing the **FUNCTION** pushbutton while in **Local**.

- Press the **NEXT OPTION** (**0**) or the **PREVIOUS OPTION** (**1**) pushbutton to change the display to the next menu item.
- Press the **ENTER** (**4**) pushbutton when the display shows **FCT:Status**. This causes the printer configuration status sheet to print. This sheet contains all the information about the current printer configuration.

5000 Series - Status and Setting Options

The 5000 Series printers are menu driven and all options for IGP are located under the Set Up Menu and Filter submenu. For a complete description of all options available and procedures for selecting the menu options, see the User's Manual for the model printer being used.

The option to print a Status Page is located under the Operator Menu and Show submenu.

- While in the Operator menu, press the left or right arrow pushbutton until the LCD display shows **Show**.
- Press the down arrow pushbutton to access the **Show** options.
- Press the left or right pushbutton until the LCD display shows **Status Page**.
- Press the **Select** pushbutton to print the Status Page. Pressing the **Clear** pushbutton will cause the printer to stop printing.

For additional information, see the User's manual for the model printer being used.

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